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TIMBER MANAGEMENT PLAN

RIO GRANDE NATIONAL FOREST

General Statement
and
Working Circle Plan

July 1, 1962 - June 30, 1972

REGION TWO

FOREST SERVICE

U. S. DEPARTMENT OF AGRICULTURE

RIO GRANDE NATIONAL FOREST

General Statement
and
Working Circle Plan

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GENERAL TIMBER MANAGEMENT STATEMENT
U. S. DEPARTMENT OF AGRICULTURE
RIO GRANDE NATIONAL FOREST - Region 2

COLORADO

Prepared by /s/ Thomas W. Sears — Aug. 18 — 1960

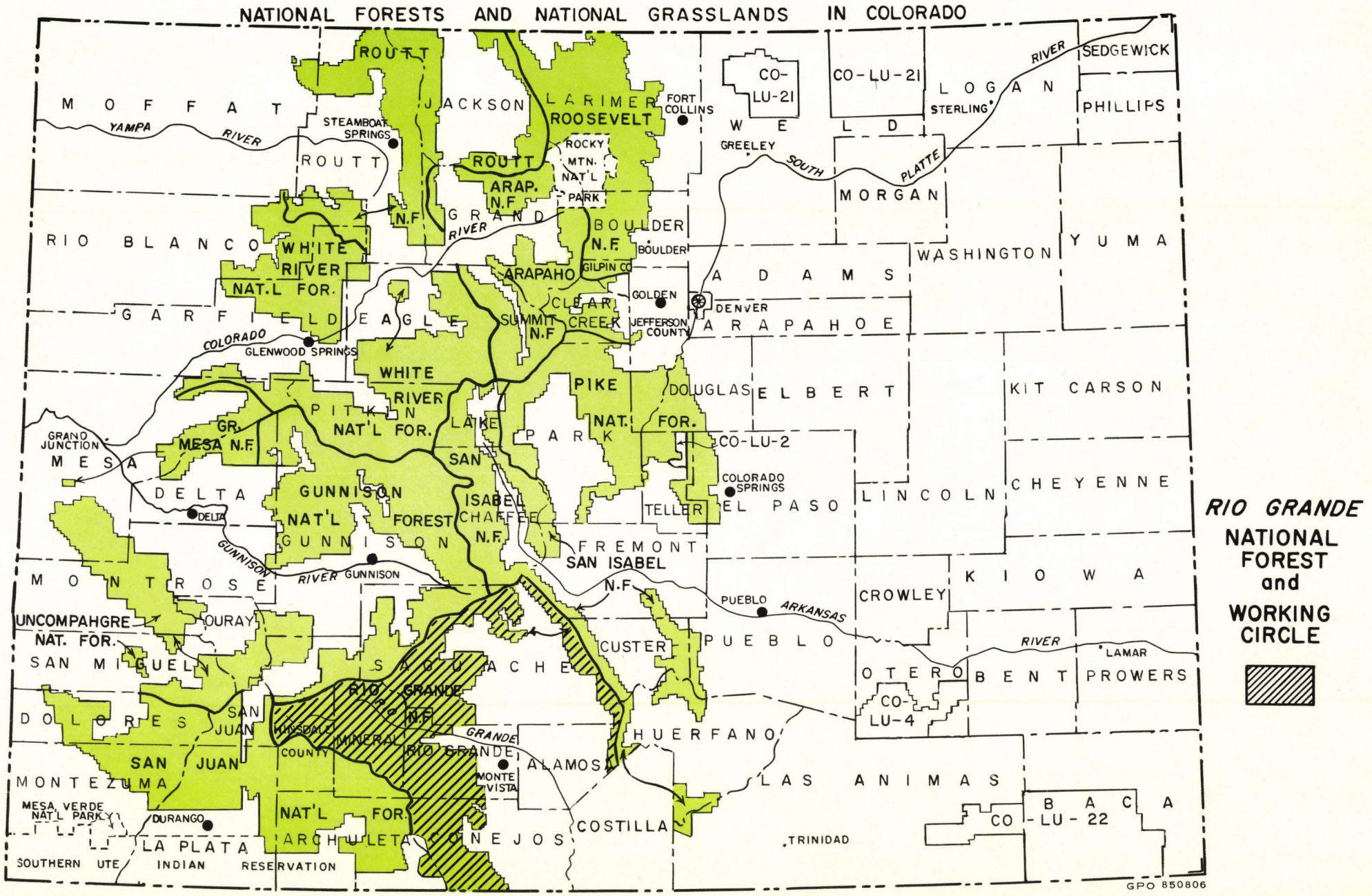
Approved by /s/ Frank J. Smith, Forest Supervisor — Aug. 19 — 1960

/s/ H. C. Eriksson, Acting Regional Forester — Sept. 19 — 1960

/s/ Edward P. Cliff, Acting Chief, Forest Service — October 8 — 1960

Reviewed by:

Region			Washington Office	
Initials	Date		Initials	Date
CCA	8/24/60	Timber Management	DJM	9/30/60
HAH				
WEP	8/29/60	Multiple-Use Coordination		


NATIONAL FORESTS AND NATIONAL GRASSLANDS IN COLORADO
ROUTT
JACKSON
LARIMER
ROOSEVELT
FORT COLLINS
CO-LU-21
CO-LU-21
LOGAN
SEDGEWICK
PHILLIPS
STERLING
RIVER
MOFFAT
YAMPA
RIVER
STEAMBOAT SPRINGS
ROUTT
ROUTT N.F.
ARAP. N.F.
ROCKY MTN. NAT'L PARK
GREELEY
SOUTH PLATTE
RIVER
MORGAN
GRAND
RIVER
BOULDER N.F.
BOULDER
RIO BLANCO
WHITE RIVER NAT.L FOR.
ARAPAHO
GILPIN CO
WASHINGTON
YUMA
ADAMS
GOLDEN
DENVER
CLEAR CREEK
SUMMIT N.F.
JEFFERSON COUNTY
ARAPAHOE
GARFIELD
EAGLE
COLORADO
GLENWOOD SPRINGS
WHITE RIVER
PIKE NAT. FOR.
DOUGLAS
ELBERT
KIT CARSON
PITKIN
LAKE
PARK
GRAND JUNCTION
GR. MESA N.F.
MESA
CO-LU-2
SAN
COLORADO SPRINGS
DELTA
GUNNISON NAT'L FOREST
ISABEL
CHAFFEE N.F.
TELLER
EL PASO
LINCOLN
CHEYENNE
DELTA
GUNNISON
GUNNISON
RIVER
FREMONT
SAN ISABEL N.F.
MONTROSE
PUEBLO
ARKANSAS
CROWLEY
KIOWA
UNCOMPAHGRE NAT. FOR.
OURAY
CUSTER
PUEBLO
RIVER
LAMAR
SAN MIGUEL
SAWATCH
OTERO
BENT
PROWERS
RIO GRANDE N.F.
CO-LU-4
DOLORES
SAN JUAN
HINSDALE
COUNTY
MINERAL
RIO GRANDE
GRANDE
HUERFANO
SAN JUAN
RIO GRANDE
ALAMOSA
MONTE VISTA
MONTEZUMA
LAS ANIMAS
MESA VERDE NAT'L PARK
DURANGO
NAT'L FOR.
ARCHULETA
CONEJOS
COSTILLA
CO-LU-22
BACA
LA PLATA
TRINIDAD
SOUTHERN UTE INDIAN RESERVATION
RIO GRANDE
NATIONAL FOREST and WORKING CIRCLE
GPO 850806

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See p 5-9 of W.C. Plan

INTRODUCTION

The timber management plan for the Rio Grande National Forest consists of three parts; namely, the General Timber Management Statement for the forest, the Rio Grande Working Circle Plan, and the Rio Grande Working Circle Compartment Record.

The General Timber Management Statement contains a description of the forest, its history as it pertains to the timber resource, its present resource and industry condition, and its timber management objectives from a long-range viewpoint. The coordinated management guides have been applied in stating these objectives. The coordination between timber use and that of other national forest resources is described in the multiple-use management plan. Because of the nature of the topics discussed, the General Statement will need only infrequent revision.

The Working Circle Plan specifies, for a 10-year period, the timber management action for the working circle. It contains detailed tabulations of commercial timberland areas and volumes, allowable cut calculations, a cutting budget programming timber sales for the 10-year period, and the roads needed to remove the timber. It also states timber sales policies, and outlines the stand improvement and protection needs for the period. This plan will be revised each ten years. More frequent revisions may be made if changes in conditions make such revision desirable.

The third part of the plan is the Compartment Record. This is an atlas binding of record sheets and type maps for each compartment. This record provides for a continuous inventory through periodic adjustment for changes in areas and volumes in timber types. Such changes may occur through timber harvest or through destruction by fire or wind, or they may result from additions of forest land and timber. Accomplishments in timber stand improvement and in reforestation are also shown in the Compartment Record.

The parts of the plan supplement each other to provide objectives, policies, and basic data to guide the administration of the timber resource. In addition, reference will be made to the Land Management Plan for the Western Colorado Subregion and to the Land Management Block Plans for the Rio Grande National Forest.

LAND DESCRIPTION

Location

The Rio Grande National Forest is located in the extreme south-central portion of the State of Colorado and includes portions of San Juan, Hinsdale, Mineral, Saguache, Rio Grande, Archuleta, Alamosa, and Conejos Counties. In general, it forms a horseshoe-shaped band around the San Luis Valley, taking in the headwaters of the Rio Grande drainage. The main portion of the forest is bounded on the east by the San Luis Valley, on the south by New Mexico, and on the west and north by the Continental Divide. The "East Range" portion consists of the western slope of the Sangre de Cristo range from Poncha Pass on the north to the Costilla County Line on the south.

Subdivisions

The working circle consists of the entire Rio Grande National Forest. Block subdivisions correspond to the six ranger districts on the forest. The working circle is further subdivided into 96 compartments.

Compartment 84 crosses the present boundary of the Sheep Mountain Wild Area. A change in this boundary is, however, in process, and it is anticipated that the revised line will be as shown between compartments 84 and 85 on the map. The wild area boundary will be revised on the compartment map when the change in status is approved.*

The area for each block and the total for the working circle is shown by ownership classes in Table 1 which follows:

*Change in boundary of wild area made as planned, 11/22/61.

Table 1

Area By Ownership

Thousand Acres

Ranger Districts	National Forests: Commercial Forest Land	Non-Commercial	Non-Forest	Reserved	Total	State, County, etc.	Private	Grand Total
Alamosa	130	38	71	-	239	1	15	255
Alder	128	28	93	-	249	1	22	272
Conejos	94	23	73	-	190	2	11	203
Creede	170	47	149	58	424	0	26	450
Del Norte	204	27	59	-	290	1	23	314
Saguache	247	55	114	44	460	2	7	469
Total	973	218	559	102	1,852	7	106	1,965

Relation to Other Working Circles

Other national forest working circles adjoin the Rio Grande on all sides. The Gunnison Working Circle lies to the north, San Isabel to the east, the Tres Piedras of Region 3's Carson Forest to the south, and the San Juan Working Circle to the west. Transportation routes between the Rio Grande and the other working circles, for the most part,are over high mountain passes; hence there is little movement of sawlogs between working circles. There is, however, considerable lumber hauling into the working circle, principally to reach a railhead. An example of the latter is the trucking of a large portion of the lumber output of a sawmill and planing mill at Pagosa Springs. The finished lumber is hauled over Wolf Creek Pass, on Highway U. S. 160, to a railhead at South Fork in the San Luis Valley. Also, some Rio Grande lumber is remanufactured in other working circles. This is the case where rough, green lumber from the Rio Grande is hauled to planing mills at Chama and Santa Fe, New Mexico. In addition, rough, green lumber from the Saguache Block is hauled north to a mill at Poncha Springs on the San Isabel Working Circle for remanufacture and shipment. A few logs also follow this same route. There is a good possibility of future log movement from the East Fork of the San Juan River into the Rio Grande Working Circle for manufacture.

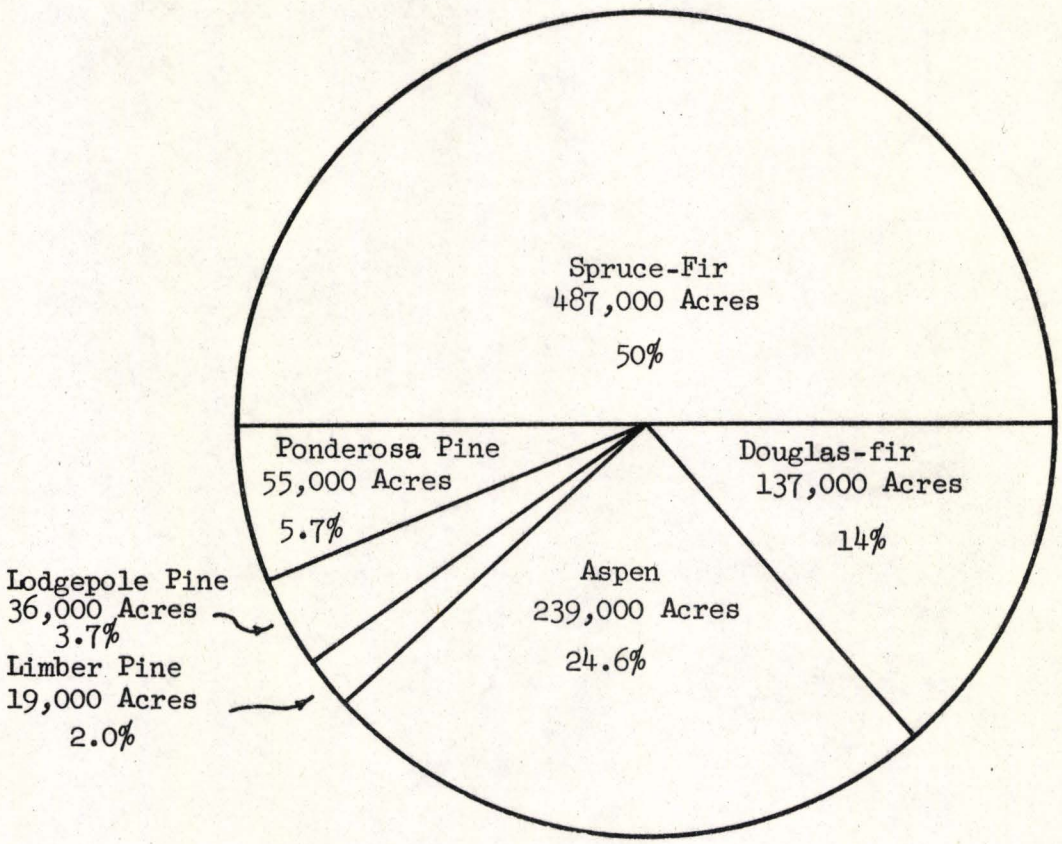
Under these conditions of close relationship for lumber manufacturing and shipping, the possibility also exists for development of an industry to utilize subsawlog-size material in either the Rio Grande Working Circle or one of those adjacent.

Forest Description

Area of Commercial Forest Land

By Timber Types

Rio Grande National Forest



Total commercial forest land
973,000 Acres

Rev. 10/1/61

Table 2

Area of National Forest Land by Classes

Thousand Acres

COMMERCIAL FOREST LAND

Timber Type	Thousand Acres	Percent
Douglas-fir	137	14
Ponderosa Pine	55	5
Lodgepole Pine	36	4
Limber Pine	19	2
Spruce-Fir	487	50
Aspen	239	25
Total	973	100

Reserved Forest Land	102
Non-Commercial Forest Land	218
Non-Forest Land	559
Total - All Classes	1852

Rev. 10/1/61

STAND CONDITION

The entire area of the Rio Grande National Forest lies at elevations above 8,200 feet, and the bulk of the commercial timber occurs above 10,000 feet. Operating seasons are, therefore, short unless provision is made for winter logging.

Spruce-Fir Type

This type occupies 50% of the commercial forest land area and contains most of the merchantable timber volume on the forest. It occurs at elevations above 9,000 feet and extends to timberline at approximately 11,500 feet. At its lower range, the type is restricted to the more moist sites in canyon bottoms and on north slopes.

Engelmann spruce (Picea engelmanni) is the principal species. It usually occurs in mixture with up to 15%, by volume, of true fir, consisting of subalpine fir (Abies lasiocarpa) and corkbark fir (Abies lasiocarpa, var. of arizonica). The true firs are most heavily represented in the younger age classes. Because of early mortality from insects and disease, the proportion of the true fir drops off in mature age classes. For instance, true fir may represent 40% or more of the pole-size stems (5.0" - 10.9" d.b.h.) but less than 20% of the sawtimber stems (over 11.0" d.b.h.).

Other associates of Engelmann spruce in mixture are blue spruce (Picea pungens) on the lower flats, Douglas-fir (Pseudotsuga menziesii) on the lower slopes, and bristlecone pine (Pinus aristata) on the dry southern aspects. These mixtures are usually limited to a narrow elevation zone.

Temporary types and conditions within the spruce-fir zone are the aspen type and nonstocked burns. Aspen stocks burns and openings up to about 10,500 feet or to somewhat higher on the south slopes.

An analysis of the age of Engelmann spruce site trees on 210 plots at 105 random locations within the spruce-fir type indicates that 61% of the type, by area, is past rotation age (140 years).

The distribution of age classes within the poletimber and sawtimber-size classes, by percent of area, as based on the age and distribution of site trees is as follows:

Age Classes (years)	Species: Engelmann spruce (per cent)	Species: True firs (per cent)
20 - 39	1	--
40 - 59	5	11
60 - 79	6	22
80 - 99	7	11
100 - 119	10	--
120 - 139	10	11
140 +	61	45
Total	100	100

Volumes per acre range from 6 MBF on the poorer sites to as much as 35 MBF on the best sites. Individual Engelmann spruce trees occasionally exceed 40 inches d.b.h. and six logs in height.

Douglas-fir Type

This type covers approximately 14% of the commercial forest land area. It occurs occasionally as pure stands but more commonly in mixture with ponderosa pine (Pinus ponderosa), blue spruce, white fir (Abies concolor), Engelmann spruce, and limber pine (Pinus flexilis). Species composition varies with every change in slope, aspect, moisture condition and elevation. The range of the type is from the lowest timbered elevations, about 8,200 feet, to 10,500 feet. The type occurs on northern slopes at the lower elevations and on southern slopes at the upper elevations. The accessibility of this type has resulted in a large portion being cut over prior to 1916. Remaining virgin stands occur on steep, rocky areas difficult of access. The existing overmature Douglas-fir trees are usually of poor form and contain considerable defect, principally ring shake and butt rot. Although the quality of the timber is, in general, very poor, the desirable characteristics of the lumber and the limited local supply have resulted in a continuing demand for the species.

Old cut-over areas and burns within the type now support an overstory of aspen and a satisfactory understory of Douglas-fir saplings and poles.

Ponderosa Pine Type

The ponderosa pine type occupies elevations from 8,200 to 9,500 feet and covers approximately 6% of the commercial forest land area. This type is found chiefly on dry, rocky or gravelly flats and along rough canyon walls and benches.

Stands within the type are generally pure and occur in small, even-aged groups. Ponderosa pine is definitely a fringe type on the forest. The usually poor sites with their low per-acre stocking produce limby trees of low quality. The volume per acre averages about 1.8 M B.F. The better and more accessible stands were heavily cut over prior to establishment of the forest.

A characteristic of the ponderosa pine type is its heavy infection by dwarfmistletoe (Arceuthobium vaginatum).

Lodgepole Pine Type

This type is located on the northern end of the forest and the southern limit of its natural range is in Township 44 North. The type occupies only about 4% of the commercial forest land area. It has established itself on old burns but is not well adapted to site conditions or climate at this latitude. The stands are typically even-aged. Most of the mature stands have been cut over. Those remaining average about 13 inches d.b.h., are overaged, and are not making appreciable growth. Stands are characterized by a large number of trees having fire scars, spike tops and many other defects. Volumes per acre average about 2.1 M B.F., because of poor tree form and site conditions. The younger stands of lodgepole pine are overstocked. For example, stagnated stands occur in which trees 80 years of age average less than two inches d.b.h. A considerable local demand exists for corral and cellar poles and this has been met by thinning immature stands. Reproduction on the older cutover areas is generally overabundant.

Aspen Type

The aspen type makes up approximately 25% of the commercial forest lands. Early day fires, prior to the creation of the national forest, are credited with the establishment of the large acreage of the type. Most of the trees are too small and defective to be merchantable except for fuel and small poles. Most of the area would be classed as Site III and IV. An understory of conifers is present on the better sites. Most of the area in this type will eventually reconvert to conifers.

Bristlecone Pine Type

This minor type occurs on warm, rocky slopes at high elevations. In pure stands, the trees usually are too rough and scrubby to be merchantable. When the species occurs in the Engelmann spruce type, however, it develops better growth characteristics and some trees are merchantable for sawtimber.

Pinyon-Juniper Type

This type is found in the foothill area at the lowest elevations adjacent to the San Luis Valley. Its primary importance is for watershed protection and wildlife habitat. Products are limited to fuel wood and fence posts for local use.

SUMMARY OF RESULTS UNDER PREVIOUS PLANS

Prior to this plan revision, the forest was divided into six working circles. Five of the six plans had been approved. Due largely to the lack of demand for timber, no attempt had been made to keep the plans revised on schedule. The following table summarizes the plans as to date of approval, area, volume, and allowable cut.

Working Circle	Date of Approval	Area of Comm. Forest Land M Acres	Total Volume MMBF	Annual Allowable Cut MBF
Rio Grande	3/5/31	349	1,067	(40,446 orig.) 14,228 (1948 Rev.)
Valley	4/5/54	85	634	9,900
Carnero	2/24/26	29	126	2,000
Saguache	5/16/28	128	427	5,150
Bonanza	3/31/39	25	53	690
San Luis	Unapproved	28	111	1,000
Total	--	644	2,418	32,968

The objectives contained in the above timber management plans and policy statements were to:

1. Produce a maximum volume of timber products under sustained yield.

2. Establish a productive forest of best-adapted species on every acre of potential timber land.

3. Cut 40% to 50% of the volume in mature trees and, at the same time, cover as much national forest area as practicable to provide access for protection purposes.

4. Build up and maintain a permanent wood-using industry to utilize the allowable timber cut.

5. Maintain and improve watershed values.

6. Use other resources to the extent compatible with maximum timber production.

Progress toward these objectives has been positive but at a much slower rate than originally anticipated. This was due to the slow development of a timber industry to utilize the allowable cut of timber from the working circles. Without a timber cut somewhat approaching the allowable cut, material accomplishment of the six objectives listed above was not possible.

During the period 1931 through 1947, the average annual cut was only 2,070 MBF, or 3.5% of the annual allowable cut of 59,000 MBF.

As indicated in the table, the allowable cut for the old Rio Grande Working Circle was reduced from 40,446 MBF to 14,228 MBF at the time of its last extension (1948). This action reduced the forest's allowable cut to 32,968 MBF.

In 1957, steps were taken to consolidate the six working circles into one and the annual allowable cut was reduced to 28,800 MBF as an interim figure pending completion of the new timber inventory. By temporary Directive of February 29, 1960, the Chief approved this interim allowable cut. For the period 1957 through 1959, the actual cut was 18,700 MBF or 65% of the allowable cut.

The graph, page 12, shows the actual cut since establishment of the forest.

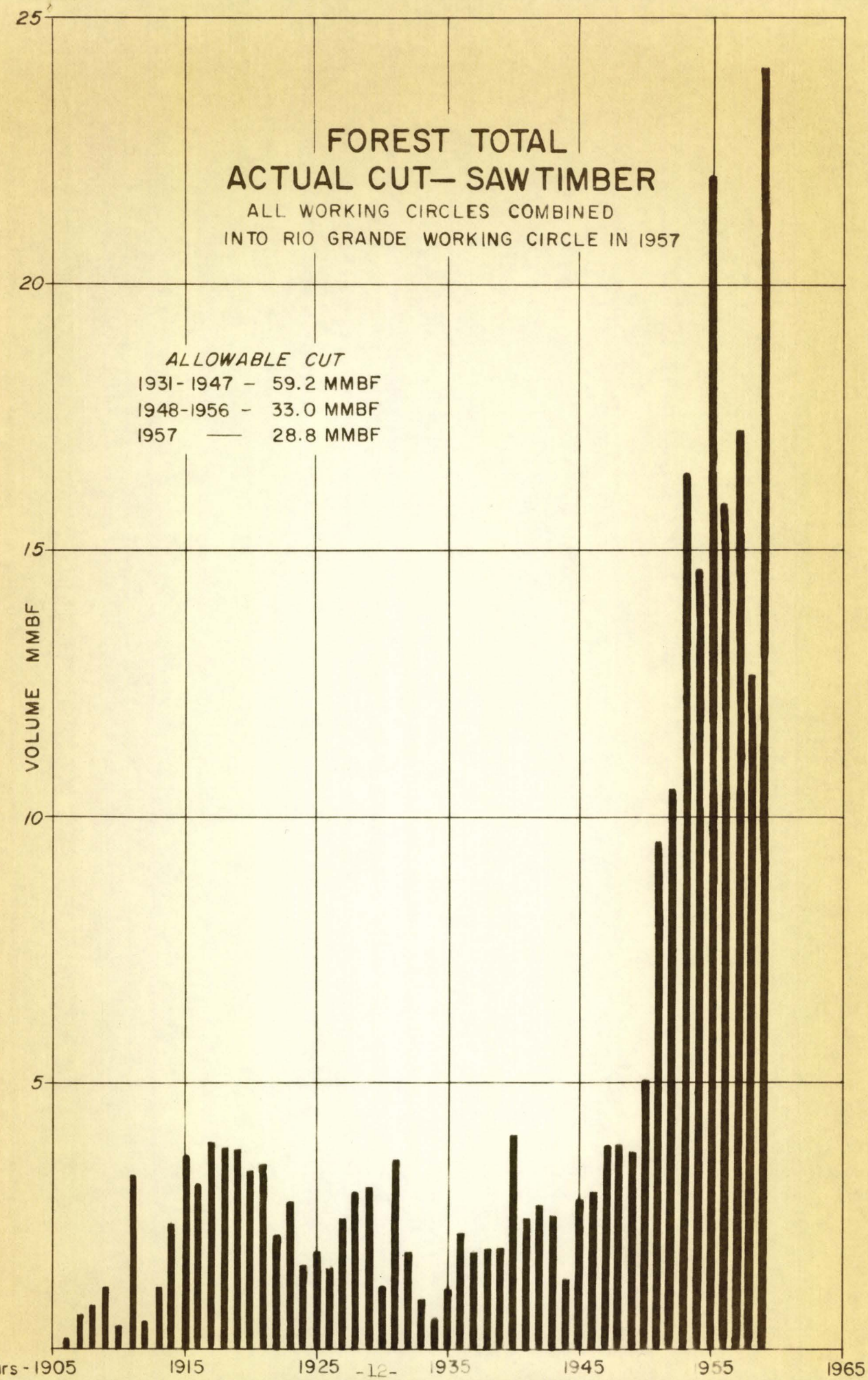
SILVICULTURAL SYSTEM

System Used in Past

The management objective of previous plans was to maintain uneven-aged stands of all species through a tree and small-group selection system of cutting. The marking practice in all timber types was based on approved marking rules prepared for the working circle. These were later modified in accordance with regional marking guides.

The principal objective of the marking rules was to improve the growth and composition of the stand by harvesting the mature and overmature timber and by removing defective, diseased, and suppressed trees and inferior species. A further objective was to obtain wind-firmness by leaving a stand having a canopy of uniform height.

Marking guides which specified clear cutting in the overaged stands in the spruce-fir type were first applied on the forest in 1954. A cutting pattern of alternate cut and leave strips about 200 feet in width was used. The objective was to remove about half the mature and overmature timber on the sale area and to regenerate the


FOREST TOTAL
ACTUAL CUT— SAW TIMBER
ALL WORKING CIRCLES COMBINED
INTO RIO GRANDE WORKING CIRCLE IN 1957
ALLOWABLE CUT
1931 - 1947 - 59.2 MMBF
1948-1956 - 33.0 MMBF
1957 —— 28.8 MMBF
VOLUME MMBF
25
20
15
10
5
Years - 1905
1915
1925
1935
1945
1955
1965

clear-cut strip, principally by seed produced on the adjacent leave strip. Windfirmness in the leave strip was obtained principally by limiting the width of the cut strip. Partial cutting, to remove the overstory, was applied to two-storied stands.

Results from Application of the Silvicultural System

1. Under a System of Partial Cutting

a. Ponderosa Pine Type - Much of this type was cut over by the early 1900's and the residual stands are mostly young and of good vigor. There are, however, some areas with heavy infection by dwarfmistletoe. Reproduction is satisfactory on about half the cut-over area. Growth studies made on Middle Alder Creek 40 years after cutting showed an average net annual increment of 81 bd. ft. per acre. More recent cutting, in the few stands which escaped early-day cutting, removed defective and suppressed trees and those which were mature and not needed as a seed source.

b. Douglas-fir Type - Most of this type was also cut over in early-day logging operations. There is generally a well-stocked stand of reproduction and poletimber in this type but the composition is heavy to true firs, particularly on north slopes. Moderate damage from dwarfmistletoe is present over most of the range of the type.

Growth studies made in the McCall Creek area 40 years after cutting show an average annual increment of 54 bd. ft. per acre.

c. Spruce-Fir Type - Partial cutting, applied in this type since 1908, was largely discontinued in 1955. Under the system of partial cutting used, 20% to 30% of the stems 10 inches d.b.h. and larger were removed to yield a cut of 40% to 70% of the volume.

In two-storied stands such as in the Bear Creek and Difficult Creek compartments on the Alder District, cutting removed only the larger, upper-story sawtimber trees and a few defective trees in the understory. The residual stand, in such cases, was still fully stocked and remained windfirm. Windthrow has been negligible in the spruce-fir type. Bark beetle activity in stands subjected to partial cutting has remained in an endemic stage.

Growth studies made on partially cut areas on Willow Creek, South Rock Creek, and Middle Alder Creek 40 years after cutting show an average net annual increment of 178 bd. ft. per acre.

Partial cutting will continue to be applied to travel and water influence zones. Details of the application of the marking guides in such zones will be included in the presale prescription for each sale area.

2. Under a System of Clear Cutting

a. Spruce-Fir Type

(1) Previous System - Commercial clear-cutting to a minimum 10-inch d.b.h. in alternating cut and leave strips has been employed on over half the area cut over since 1955.

Cutting area layouts were designed to remove 40% - 50% of the total sale area volume through clear cutting that per cent of the area.

In logging the cut strips, reproduction and the residual pole stand have been protected as far as possible. Fill-in seeding from the leave strips was depended upon to obtain satisfactory stocking. Failure to obtain sufficient reproduction by this method has been due principally to the lack of good seed years. Increase from endemic to epidemic populations of Engelmann spruce bark beetles in the leave strips has occurred in several instances from accumulations of top and cull material remaining in the cut strips.

Windthrow has increased above that in the partially cut stands but still has not been excessive.

(2) Current System - The uncertainties and weaknesses in the above-mentioned application of clear cutting have been considered in the practices outlined in the Timber Management Guides, FSH 2-2442.8. Under these guides, the clear cutting prescribed for mature and overmature spruce-fir stands may be by patches

or strips, with topography, soil erodability, windfirmness, insect and disease control, logging system, and road and aesthetic needs being considered in determining the size and shape of the areas to be clear cut. Bark beetle activity will be controlled through 100 per cent disposal of slash and cull material after it has served to trap emerging insects. The probability of obtaining satisfactory regeneration promptly is increased through insurance planting immediately after cutting. Natural regeneration, from the adjacent uncut stand, can reasonably be expected to provide the balance of trees needed for full stocking.

The Management Guides for the type (FSH 2-2442.8) prescribes partial cutting for two-storied or all-aged spruce-fir stands, with the objective of converting the stand to even-aged as soon as practicable within the first two rotations.

b. Other Types

Even-aged management is likewise used for the other timber types on the forest through application of the Management Guides.

MANAGEMENT OBJECTIVES

The basic management objective is to produce the maximum quantity and quality of sawtimber under sustained yield management consistent with multiple-use principles.

In order to attain the sustained yield capacity, all timber stands will be put into good growing condition. The long-range objective will be to accomplish this within the next 40 years. This will involve the orderly harvesting of overmature, mature, diseased and defective trees and the maintenance of proper growing stock. The working circle plan will contain a 10-year program directed toward attaining desirable growing conditions. This short-term action program will be revised as necessary to meet changing conditions, and will be guided by the following considerations:

1. Attain the allowable cut as established in the working circle plan. All overmatured timber will be harvested by the year 2000. The allowable cut will be recalculated at least every 10 years and, as better information is obtained on volume, stand condition, growth, and economics, changes in the adjustment period for overmatured stands may become advisable.

2. Initiate a reforestation program that will include:

   a. Adequately stocking cut-over areas within five years after the harvest cut. This will involve fill-in planting or other regeneration measures on about 1,000 acres of spruce-fir type per year.

   b. Conducting a regeneration survey to determine, by FY 1965, all areas in need of treatment to obtain or improve stocking by desirable species. Planning the regeneration job will be accomplished in connection with this survey. Preference in the plans will be given to planting Engelmann spruce rather than lodgepole pine or exotic species.

   c. Regenerating some 50,000 acres of non-stocked commercial forest land. Pending completion of the survey discussed above, annually plant a minimum of 500 acres of non-stocked area, such as the La Manga burn.

d. Encouraging natural regeneration through site preparation and through control measures for rodents and other animals.

The reforesting of lands other than recently cut over will be scheduled for completion by not later than 1980.

3. Expedite the conversion of aspen stands back to conifers by release cutting on some 20,000 acres of lands now stocked with conifers having an overstory of aspen.

4. Develop and maintain desirable stocking of lodgepole pine stands by non-commercial and commercial thinnings. There are some 10,000 acres of lodgepole pine type producing little, if any, growth.

5. Develop a desirable distribution of age classes for each major type as soon as practical within the first two rotation periods.

6. Prevent epidemic outbreaks of destructive forest insects. Keep particularly in mind the explosive build-up characteristics of the Engelmann spruce bark beetle.

7. Keep populations of injurious mammals and rodents under control.

8. Reduce infection by tree diseases and maintain such infection at the lowest practicable level.

9. Keep fire damage to commercial forest lands within the long-range burned area objective and the annual PAR expressed in the forest's fire prevention plan.

To accomplish the above objectives, the following action will be taken:

1. Encourage increased production by the timber industry. Although there is sufficient sawmill capacity on the forest at present to utilize the allowable cut of sawtimber, production has fallen far short of this goal. This failure has been principally due to the lack of demand for the timber brought about by an inadequate transportation system. Industry promotion and timber sales will be stepped up so that the forest will be cutting the allowable cut by FY 1965.

2. Encourage a stabilized timber industry by:

   a. Planning a timber sale program, with related transportation system, to provide both winter and summer logging shows. New sales will be programmed so that the proper proportion of the volume cut will come from the more difficult areas requiring cable skidding or other special equipment.

   b. Assisting operators in developing or finding ways of applying logging methods and transportation facilities adapted to conditions of deep snow and rough topography.

3. Develop a road system that will provide for the orderly harvesting of the timber. The location of such permanent roads will be coordinated, to the extent practicable, with the needs of other resources. At least half the required roads will have to be built with forest road development funds. The availability of such funds will affect the scheduling of at least one-half the total cut for the forest.

   A transportation plan, including construction schedule, will be included in the working circle plan. This will cover a 10-year period and, if necessary, will be subject to more frequent revision to meet changing conditions. Maximum provision will be made for purchaser-constructed timber access roads.

4. Establish, by working with adjacent forests, an adequate industry that will utilize small, round material.

5. Do a good timber management job. As the forest is used by an increasingly large number of people, advantage should be taken of the opportunity to familiarize these visitors with the objectives and methods of timber management. Where practicable, examples of such activities as timber sale cutting, timber stand improvement work and reforestation efforts should be signed or otherwise publicized locally. The quality of timber management work will be that which will result in a reaction of public appreciation for a conservation job well done.

6. Give high priority to training all forest employees concerned in accomplishing the over-all management objectives set forth in this general statement.

TRANSPORTATION

The principal markets for forest products extend from the Rocky Mountains east throughout the Middle West. An adequate transportation system for movement of products from mill to market now exists.

The Denver and Rio Grande Western Railroad provides standard gauge rail transportation for forest products from Creede, South Fork, Del Norte, Monte Vista, Alamosa, and Antonito. This company also provides narrow gauge rail transportation from Antonito across the south end of the working circle to Chama, Durango, and Farmington. Much of the lumber production from the Saguache block is trucked to Salida for shipment on the D&RGW railroad.

Truck transportation, for reasons of economy and convenience, plays a large part in shipments to the south and southeast. East-west Highway U. S. 160 and north-south Highway U. S. 285 provide good connections into the transcontinental highway system. State Highways 17, 114, and 149 provide additional access into the working circle. Colorado 149 is paved from South Fork to Creede; the others are not paved inside the forest boundary.

These railroads and highways are shown on the compartment map at the end of this report.

Although existing forest development roads provide general access to the lower part of all the major drainages, few of these, however, provide direct access to commercial timber areas which lie mostly near the heads of tributary drainages. The forest development road system is, therefore, inadequate for transporting logs by truck from the woods to the mill.

Road needs to the year 2000 have been analyzed and incorporated in the forest transportation plan. These estimates are summarized in the following tabulation:

Transportation Plan
as of June 30, 1959

Primary Forest Value	Existing Miles	Additional Needs Miles	Total Miles
Timber	669	3350	4019
Adm. & Fire	1	6	7
Other Resources	91	33	124
Total	761	3389	4150

A considerable portion of the remaining sawtimber will no doubt have to be hauled to the mills over all-purpose roads. Most of the remaining timber is not in sufficiently large blocks to amortize the cost of permanent system roads.

Although the bulk of the additional road needs have a primary value for timber, all resources will be equally served. Other values, particularly for recreation and wildlife, are very high. Emphasis will continue on obtaining as much timber operator road construction as can be amortized by the volume to be sold. All-purpose funds will be utilized wherever the use of other resources will justify.

REFORESTATION

Natural

Engelmann spruce reproduction is generally abundant and small accidental openings are readily restocked in the uncut stands. The older cut-over areas in the type were partially cut and all are satisfactorily stocked. Starting in 1955, cutting in the spruce-fir type has been largely by the alternate clear-cut strip method. Under this system, the saplings and poles which were left on the cut-over area after logging amounted to about 35% of the original total number of stems. The strips, therefore, were not left in a denuded condition by logging. As 1959 was the first seed year since this system was started, it is too early to determine how much seeding-in from the side will result.

Large openings resulting from old burns in the spruce-fir type have only partially restocked to conifers, if at all. Burns below the 10,000 foot elevation are mostly supporting stands of aspen, with an understory of conifers in many areas. On north slopes, Douglas-fir and true fir reproductions are generally better represented than that of Engelmann spruce in this understory.

In burns above the 10,000 foot elevation, many of the steep southerly exposures now support grassland with a scattering of Engelmann spruce. Some of the level benches and north slopes have reforested to a good stand of spruce and true fir.

Artificial

1. Seeding

From 1909 to 1916, some 31 direct-seeding trials were made on a total of 455 acres with complete failures in every case. As a result of these failures, the direct seeding tests were discontinued. The species used and number of trials were as follows: Douglas-fir 10, Engelmann spruce 8, ponderosa pine 7, lodgepole pine 5, Austrian pine 1. Seeding was done by broadcast and seed-spot methods without soil preparation. Most of the trials were in off-site locations or on deteriorated sites such as old burns or eroded areas. These results should, therefore, not be considered conclusive. Additional seeding trials should be continued to test various methods and treatments. Research on artificial seeding is needed.

2. Planting

Between 1914 and 1957, some 90 planting trials were made on a total of 915 acres. Success in terms of establishment of a satisfactory stocking was achieved on about 10% of this area. Species used and the number of trials for each are as follows: Douglas-fir 41, Engelmann spruce 20, ponderosa pine 17, pinyon 6, juniper 4, and limber pine 2. Some degree of success was reported in about 62% of the Douglas-fir trials, 53% of the ponderosa pine trials, and in 45% of the Engelmann spruce trials. No success was reported for the other species.

Many of the trial plantings were made in erosion areas. Some were at extremely high elevations and others were located in sagebrush or fringe areas which were very dry and where wildlife and livestock use was heavy. In all cases, little or no ground preparation was done prior to planting. The deep-hole planting method was used on all trials after 1914. Fifty-five of the trials were made in a grassland type (old non-stocked burn), 26 in aspen, 4 in pinyon-juniper, 2 in sagebrush, 2 in ponderosa pine, and 1 in spruce-fir type. The greatest success was achieved in the aspen type.

3. Long-Range Needs

Most of the estimated 175,000 acres of aspen type within the working circle occupies coniferous sites. In fact, many of these acres are now satisfactorily stocked with a coniferous understory. However, approximately 25% of the type needs full or fill-in planting to conifers.

An estimated 50,000 acres of old burn formerly in the spruce-fir type now consists of grassland. Perhaps a third of this area has retained site qualities favorable to Engelmann spruce as evidenced by the scattered invaders of the species. These areas need full or fill-in planting to hasten the type reconversion. The remaining portion of these old burns has suffered severe site deterioration through loss of soil and moisture retention capabilities. Site deterioration is still continuing in some areas due to the inadequacy of the present vegetative cover. This trend must be reversed and the site built up by establishment of an effective vegetative cover.

About 12,000 acres of the ponderosa pine type is inadequately stocked and fill-in planting is needed, particularly in cut-over areas.

Comprehensive surveys are needed to determine the location and extent of areas adapted to planting or seeding. These surveys will be made during the next five years.

TIMBER STAND IMPROVEMENT

Very little timber stand improvement work has been initiated or accomplished to date. Principal needs are the release of conifers from aspen on an estimated 40,000 acres, and thinning of lodgepole pine reproduction on approximately 6,000 acres.

Timber stand improvement plans will be prepared for all timber sales, and sale area betterment deposits will be taken to accomplish the work. Methods applied will be in accordance with instructions in FSH 2470.

PROTECTION

Fire

Many of the old burns on the Rio Grande National Forest are the result of fires prior to permanent settlement of the San Luis Valley. Most evidence indicates, however, that the larger fires of the past century occurred after settlement by the white man and that many of these were purposely set to convert the timber type to grassland. It is estimated that nearly 300,000 acres were burned over during this period.

The large fires of record were man-caused and are now marked by extensive areas of aspen and grassland in which evidence of the former timber stand was almost erased by the intensity of the burn.

Some of the larger fires on record are as follows:

Location	Year	Acreage Burned
La Garita Creek	1872	1,500
Jasper Creek - Burnt Creek	1873	4,000
Alamosa Canyon-Stunner	1875	15,000
Chama	1876	10,000
Middle Mountain, Red Mtn. Cr.,Trout Cr.	1879	5,700
Osier Mountain	1879	30,000

Location	Year	Acreage Burned
Dry Gulch	1879	800
Goose, Elk, Raspberry, Trout, Soda, Leopard, and Roaring Fork Creeks	1881	4,000
Cat Creek	1887	3,200
Rock Creek, Raton Creek	1892	11,000
Saguache Creek	1892	11,000
Douglas Mtn., Lime Creek, McCall and Deep Creek	1893	5,400
Willow, Shallow and Sunnyside Creeks	1893	18,500
Dry Gulch, Mammoth Mtn., Farmers Creek	1893	3,800
Globe Creek, Klondike Mtn., Adams Fork	1900	6,000
Tie Hill-Goodrich, Decker and Lake Fork Creek	1900	2,900
Platoro	1939	60
Goose Creek	1952	600
Total		133,460

Fire occurrence and damage since the establishment of the national forest has been very low as shown by the annual averages by periods as follows:

Period	No. of Fires	Acreage Burned (all types)
1909-1932	5.9	50.4
1933-1943	(no record)	
1944-1959	14.0	72.9

Less than half the area burned over during this period has been commercial forest land.

Insects

No timber losses of catastrophic proportions due to insects have been recorded on the Rio Grande National Forest. The Great Basin tent caterpillar, Engelmann spruce bark beetle, Black Hills bark beetle and spruce budworm have reached an epidemic stage in several repeated cycles. These epidemics are described below:

1. Great Basin Tent Caterpillar (Malacosoma fragilis)

The extensive aspen stands in the Conejos River drainage have been subjected to a more or less continuous infestation by tent caterpillars for the last 60 years. The earliest major epidemic in this area was reported in 1896. Successive epidemics resulting in complete defoliation and death of the aspen host occurred in 1906, 1916, 1928-32, 1936-38, 1949, 1952, and 1954-59. These outbreaks have been largely confined to the same general area in the Conejos River drainage with some drift in a northwesterly direction into the Alamosa River, La Jara Creek, and Rock Creek drainages.

A separate epidemic on the north side of Beaver Mountain, the east side of Trout Mountain, and the Frisco Creek drainage occurred during the late 1940's and resulted in complete defoliation of the aspen for several successive years. This infestation did not result in widespread tree kill.

Another epidemic occurred near the head of the Rio Grande in 1940-41 causing complete defoliation of aspen over an area of approximately 45,000 acres. This infestation died out as rapidly as it appeared, with no permanent damage to the aspen stand.

A pilot control project using a virus spray was conducted in the Conejos River area in 1958; results were inconclusive. No previous control work had been done on the forest.

2. Spruce Budworm (Choristoneura fumiferana)

The earliest recorded epidemic of this insect occurred in the Fox Creek area in the late 1930's, resulting in a heavy kill of Douglas fir. In 1945 an epidemic started in the east Cattle Mountain-Grouse Mountain area. This infestation has continued unabated through 1959 and has spread over 43,500 acres in the lower South Fork drainage. No control measures have been initiated to date. The cumulative effects of the spruce budworm infestation over the past 12 years are quite serious, particularly in the Cattle Mountain area where, in extensive areas, true fir of pole size and smaller has been killed almost 100% and Douglas-fir stands of all age classes have been seriously damaged.

3. Black Hills Bark Beetle (Dendroctonus ponderosae)

Populations of the Black Hills beetle reached epidemic proportions in the past in a number of localized areas throughout the ponderosa pine type. Small control projects were initiated in about 1938 on various areas of the forest. A small epidemic on the lower Conejos received annual treatment from 1953 to 1957. The easy accessibility of the type has made control through salvage logging feasible. The infestation is now in an endemic stage.

4. Engelmann Spruce Bark Beetle (Dendroctonus engelmanni)

This pest has apparently been present in endemic populations for some time as evidenced by larval galleries in old snags.

Epidemic infestations were first noted in the virgin stands in upper Pass Creek in 1950. Efforts to control the infestation by logging, started in 1951 and continued through 1954, were supplemented by chemical treatment in 1952 and 1956. A blowdown in the fall of 1956 added a new incubation source and the infestation is still present but is being held in check for the present by logging.

In 1958, an infestation of epidemic proportions was discovered in the virgin timber of the leave strips in the Long Gulch and Difficult Creek timber sales. Control measures of logging, trap trees, and follow-up chemical treatment are being employed.

In 1959, an epidemic in the virgin timber on approximately 100 acres of leave strips in the Cross Creek timber sale was discovered. This area is being treated in connection with logging. All tops and cull material are yarded into piles at the landings to serve as trap material. These piles are left in place for one season to trap the current beetle flight and are then burned before the new brood emerges.

Infestations in the cull material have been discovered on all recent spruce timber sales on the forest. Control measures consisting of chemical treatment of culls, provision for trap trees or complete slash disposal are now being employed on all sales.

5. Douglas-fir Bark Beetle (Dendroctonus pseudotsugae)

Concentrated killings of mature and over-mature Douglas-fir by this insect have occurred during the past few years. The greatest damage has been on the Saguache ranger district along the lower slope of the Sangre de Cristo range, particularly near the Sand Dunes. The lower Conejos and Alamosa canyons have also sustained considerable damage. The intensity of these infestations appears to be decreasing. The removal of infested trees by logging seems to be the most practical method of control.

Disease

The most readily identified damages from disease are the volume losses from rots; primarily western red rot (Polyporus anceps) and white pocket rot (Fomes pini). Defect studies on commercial sales within the working circle give an average percentage volume loss due largely to these rots as follows:

Species	DBH Class 10" - 20"		DBH Class 21"+	
	Trees Sampled	Defect %	Trees Sampled	Defect %
Ponderosa pine	102	12.8	12	13.3
Engelmann spruce	1969	13.0	310	19.2
True firs	215	18.2	21	34.5
Douglas-fir	135	25.5	81	24.1
Limber pine	110	45.5	4	66.2

Dwarfmistletoe (Arceuthobium vaginatum) on ponderosa pine is so prevalent in some areas that virtually every stem is infected. The lodgepole pine stands are virtually free from dwarfmistletoe infection.

Peridermium rusts are common in Engelmann spruce stands and, although the resulting damage in terms of growth and mortality is difficult to evaluate, it appears that the infected trees are rendered more susceptible to breakage and insect attacks.

Weather

Seasonal spring winds commonly blow down or break off a few exposed trees and contribute to defect in standing timber through windshake. However, the occasional wind of gale proportions occurring particularly during a period of saturated soils, can inflict catastrophic

damage in the spruce-fir type. Such a blowdown occurred in October of 1911, affecting the whole south half of the forest. A small scale blowdown occurred in October 1954, damaging small areas in the Alder, Park, and Pass Creek drainages. In October 1956, a severe blow inflicted spotty damage from Wolf Creek Pass south to Cumbres Pass.

These blowdowns involve large quantities of timber which provide incubation material for a build-up of the Engelmann spruce bark beetle population.

Animals

Considerable damage by porcupines is occurring in some areas of the ponderosa pine type. Forest Service employees, Fish & Wildlife Service trappers, timber sale operators, hunters, and other forest users are encouraged to kill the animals encountered on their travels. The porcupine population is relatively small and can be kept under control by shooting. New plantation areas will be protected by poisoning as necessary.

LAND PROBLEMS

Rights-of-Way

Major problems of access are anticipated on the drainages of the Rio Chama, Elk Creek, Goose Creek, Trout Creek, and Red Mountain Creek. Working circle plans will include a schedule for obtaining rights-of-way in these and other necessary locations sufficiently in advance of road construction so that timber sales will not be delayed. The objective will be to obtain rights-of-way in and for the United States for all roads needed for use and development of the timber resources of the national forest. The Forest Service will not invest in roads on county-owned rights-of-way unless the pattern of settlement, or approved plans for future public highways, give reasonable assurance that the county will permanently retain them as public roads. The same principle will apply to any rights-of-way obtained by the State.

Before action is taken to obtain rights-of-way, reference will be made to policies and procedures contained in FSM-FSH 5460.

Mining Claims

Mining claims and patents are numerous on the Alamosa, Creede, and Saguache Districts. Only a few of these lie, however, in commercially timbered areas. Where access to timber is affected, rights-of-way will be obtained as mentioned above. Instructions applying to timber cutting on unpatented claims are contained in FSH 2410.

Acquisition Program

The Rio Grande is more favorably endowed with a consolidated ownership pattern than most forests. Very little of the private lands contain commercial timber or would make desirable acquisition for timber management purposes.

MULTIPLE-USE COORDINATION

The Rio Grande National Forest Land Management Block Plans and the Land Management Plan for the Western Colorado Subregion give the over-all objectives, directions, and management decisions for multiple-use coordination within the forest. These plans, and FSM 2100, will be referred to when presale prescriptions are prepared. Most of the commercial forest lands lie within the "Intermediate Zone" as described in the land management plan. Management priorities in this zone are primarily for water and timber and secondarily for range and wildlife. Where travel and water influence zones or special areas fall within the intermediate zone, the primary use is for recreation and water. In such cases, appropriate guidelines for the management of the timber resource will be followed. These zones are defined in the Land Management Plan for the Western Colorado Subregion. Comments on coordinating timber management with other resources and uses follow.

Water

The Rio Grande National Forest produces a high yield of water of great value to the economic welfare of the San Luis Valley and to other areas downstream dependent upon water from the Rio Grande drainage. Estimates indicate a water yield of 1,280,000 acre-feet from national forest land, or about 43% of the total yield from the upper Rio Grande watershed in Colorado and New Mexico.

Because of the high values as watershed, timber cutting practices will be compatible with maintaining or, if possible, increasing water yield.

No timber will be cut on unstable soil or on extremely steep slopes unless adequate measures are taken to prevent accelerated soil movement.

Watershed values and erosion control measures will be considered in locating, designing, constructing, and maintaining all roads, skid trails, and other improvements necessary for timber harvesting.

Timber sale contracts will contain provisions to prevent or repair soil and watershed damage.

Grazing

To date, no serious conflict between grazing and timber use has been experienced. Possible future conflicts will be minimized by the following guidelines.

Range improvements such as fences, corrals, driveways, and water developments will be protected from logging damage by appropriate clauses in timber sale contracts.

Logging and timber access roads will be located so as to avoid natural parks and meadows in-so-far as practicable.

Camps, mill sites, and landings may be permitted along the edges of dry parks and openings in preference to clearing productive timber land for the purpose because of the comparative ease of site restoration. However, when such use is permitted, provisions will be made for complete cleanup and rehabilitation of these areas.

Landings, mill sites, sawdust sites, or other occupancy will not be permitted in wet meadows where damage to soil structure and water retention capacity through compaction may result.

Livestock will be excluded from plantations where necessary to protect the trees from grazing damage.

Wildlife

Guidelines as stated in the "Wildlife Coordination Plan" for the Rio Grande National Forest will be referred to in preparation of presale prescriptions and when coordinating timber management objectives with wildlife management practices.

Clear cutting by patches or strips increases fringe area and hence is beneficial to wildlife.

Plantings in wildlife concentration areas will be deferred until problems affecting tree survival under such conditions can be solved.

Damage to fishing streams by siltation and logging debris will be prevented through proper road location and design, slash disposal, cutting area layout, and logging practices.

Recreation

Recreation and water have priority over timber use in the "Travel Influence" and "Water Influence" zones of the forest as established by the Multiple Land Use Management Plan for the Western Colorado Subregion. Discussion of timber use coordination in these zones follows.

Travel Influence Zone

Timber will be harvested in such a manner and to a degree that will be compatible with and will enhance recreation values and "show windows" along roads. Slash will be 100 per cent abated.

The working circle plan will include a specific statement of cutting planned within the roadside zone of Highway U. S. 160. Approval of the plan constitutes approval for the cutting. Any other cutting of live timber in this zone requires approval of the Chief. For other highways and recreation roads of first importance, the forest supervisor is authorized to harvest timber for special demonstration purposes, for removal of insect-infested and diseased trees. for safety hazard reduction, and for essential clearing for approved purposes.

Water Influence Zone

Timber utilization will be limited to (1) sanitation and salvage cutting, and (2) cutting specified in recreation site or area plans.

Complete slash abatement will be practiced where recreation use makes such action desirable.

The aim in all timber cutting in this zone will be to protect and enhance water and recreation resource values.

SUPPORTING DATA

History

Settlement of the San Luis Valley began to assume significant proportions during the late 1860's and created a demand for wood products from the surrounding forests. Logs were needed for the construction of houses and barns. Poles were in demand for fences and corrals, and fuel wood had to be provided.

The early cuttings were made from the more easily accessible fringes of the forest, but they were widely scattered and of little consequence from the standpoint of volume. With the increasing number of settlers, however, largely coincident with the discovery of gold at Summitville in 1870, a demand for lumber soon arose and commercial sawmills were established.

The first sawmill of record was constructed on La Garita Creek in 1870. This mill provided lumber for construction of the early buildings in Del Norte, a town which grew rapidly after its establishment in 1872 as a supply point for prospectors and settlers. In 1872 another mill was set up on the north side of the river, opposite Del Norte. The first mill in the South Fork area was established in 1874. In 1875 a mill was set up near Summitville to supply lumber for the booming mining operation.

Settlement of the San Luis Valley increased rapidly after 1870 and large-scale commercial farming began. Irrigated cropland acreage rose from 12,000 acres in 1870 to more than half a million acres by 1920. Farms contained 150 to 200 acres in contrast to the 20 or 30 acres common in northern New Mexico.

During the 1880's other sawmills and mine-timber operations were started on Pinos Creek, Elk Park, Lower Goose Creek, Alder Creek, Alder Bench, East Alder, La Garita Park and Lower Raton Creek. Also during this period the construction of the railroad into Alamosa from the east created a demand for ties. Most of these were cut along the river between South Fork and Wagon Wheel Gap.

In 1890 gold was discovered at Creede, and the demands of the mining camp led to the establishment of a sawmill there in 1891. The extension of the railroad into Creede during the 1890's also supported many tie operations along the Rio Grande.

In 1908 the Rio Grande National Forest was established by Presidential Proclamation out of the San Juan and Cochetopa

Forest Reserves. Portions of the old Cochetopa and San Isabel National Forests lying within the Rio Grande River Basin were added in 1944, bringing the forest to its present size.

The first sale on record after the establishment of the forest was made in 1905 to the Sunbeam Gold Mining and Milling Company for 10 M B.F. of dead material on what was then the San Isabel National Forest. The record indicates that timber harvest under sale procedure during the first few years after the establishment of the forest was slight. The number of individual sales, however, grew quite rapidly and increased from 10 sales in 1908 to nearly 200 in 1917. The volume cut during this period increased from 750 M B.F. to 4,000 M B.F. From 1918 through 1949 the volume cut remained fairly constant, varying from a low of 545 M B.F. during the depression years of 1933 and 1934 to a high of 4,000 M B.F. in 1940. The annual average for the period was 2,500 M B.F.

Since the establishment of the Rio Grande National Forest, the main hub of timber cutting activity has been South Fork, Colorado. A succession of mills under various ownerships have operated here since 1874. The present mill site was occupied in the early 1930's by the Galbreath Tie and Timber Company which sold to the Denver Wood Products Company in 1946. A series of changes in ownership of the plant began with the purchase by Phillips, Ballah, and Bergmann in 1950; San Luis Mills in 1951; Chicago Mill and Lumber Company in 1953; Hallack and Howard Lumber Company in 1956, and by the Boise-Cascade Lumber Company in 1960.

The expansion of the South Fork operation, which began in 1950, has been primarily responsible for the pronounced acceleration of the timber cut during the past 10 years. The Boise-Cascade Company is now planning additional plant improvements and a two-shift operation producing 25-30 MM B.F. per year.

In 1956 the Pleasant Western Lumber Company was established in Monte Vista. This operation began as a planing and shipping point with sole dependence upon transient, portable mills for its lumber production. Under this system the operation made little impact upon the timber cut of the working circle, although the operation is entirely dependent upon national forest timber.

In 1958 a permanent mill was constructed in Monte Vista, but operated only a few months before it burned down. The mill has since been rebuilt and its capacity increased. It began operation in the spring of 1960, with an expected annual cut of 10 to 12 MM B.F.

The Fort Garland Lumber Company, located at Fort Garland, Colorado, is a modern and efficient plant which has been producing about 15 MM B.F. of lumber annually from private timber.

The R.C.S. Lumber Company at Antonito has operated for the past five years on private timber in northern New Mexico. Only a drying yard, planing mill, and shipping facilities are located at Antonito where the rough, green lumber from some 50 portable mills is processed. This operation has been producing around 30 MM B.F. per year. The private timber supply is about cut out and the Company has expressed interest in future national forest sales on the southern end of the forest to extend the operation for a few more years.

The total installed sawmill capacity of the working circle is now nearly 100 MM B.F. annually. The best production for any past year, however, has been only 24 MM B.F. of national forest timber, plus 45 MM B.F. of private timber.

Following is a list of major existing sawmills:

Operator	Mill Location	Type Headrig and other Facilities	Annual Capacity One Shift average operating season M B.F.	
Ft. Garland Lbr. Co.*	Ft. Garland	Circular, Planer	15,000	(now idle)
Hansen, Irvin 1/	Carnero Cr.	Circular	2,000	
Hansen Lbr. Co.	Chama,N.Mex.	Circular	6,000	
Boise-Cascade Lbr.Co.	South Fork	Circular,Planer		
		Log Gang	15,000	
Jackson, Orville 2/	W. of Creede	Circular	2,500	
Kaibab Timber Co.	La Garita	Circular	3,000	(now idle)
Lucero, Pete	Capulin	Circular	500	
Malouff, Frank	Capulin	Circular	500	

Operator	Mill Location	Type Headrig and other Facilities	Annual Capacity One shift average operating season
			M B.F.
Pleasant Western Lumber Co.	Monte Vista	Circular, Planer Cant Gang	15,000
R.C.S. Lumber Co.*	Antonito	Planer	30,000
Vance, Charles	W.of Antonito	Circular	500
Vigil, J. E.	Capulin	Circular	500
Whitman Timber Co.	Poncha Spgs.	Circular, Planer	5,000
Wilkins, Lloyd	Salida	Circular	2,000
Muir, Robert	Salida	Circular	500
Total			98,000

* Not cutting national forest timber at present.
1/ Portable under sub-contract to Pleasant Western Lumber Company.
2/ Portable under sub-contract to Boise-Cascade.

Economy

The San Luis Valley is largely encircled by the Rio Grande National Forest and may be considered the dependency zone of the working circle. The 1957 population estimate in the Colorado Year Book is 40,000 persons. This estimate indicates a five percent decrease in population since the 1940 census. All of this decrease has occurred in the rural population despite concurrent increases in the major urban communities. Rural population now makes up only 17 percent of the total.

Major sources of income for the Valley, based on the 1954 agricultural census and trends from 1950, are as follows:

	1955 Value	Trend Since 1950
Crops sold 1/	$11,800,000	Down 22.4%
Livestock sold	9,300,000	Down 28.0%
Minerals	1,100,000	Down 10.4%
Manufacturing	1,700,000	Up 40.5%
Service trades	2,400,000	Up 84.3%

1/ 74% of this value is in one crop, namely, potatoes.

Although timber products did not rate a tabulation among the major sources of income in 1954, the value of lumber produced from national forest stumpage in 1959 was approximately $2,000,000.

Agriculture has been, and will probably continue to be, the backbone of the economy of the area. Opportunities for expanded agricultural production, or even maintenance of present levels, are questionable due to the limitations of irrigation water.

Irrigation developments in the Valley reached a maximum acreage of 780,000 in 1927, then dropped during the financial depression and continued downward until the end of World War II.

Today only 650,000 acres are irrigated within the total Valley floor area of about 2,500,000 acres. Surface waters have been fully appropriated. In fact, the aggregate amount of water adjudicated to various claimants throughout the Valley is far in excess of the quantity discharged by the streams even during good water years. Downstream water commitments to New Mexico and Texas under the Rio Grande compact have not been met for several years.

Since virtually the entire water supply of the Valley is produced on national forest lands of the working circle, management practices designed to maintain or increase the supply are a vital consideration.

Mineral resources in order of total value produced in 1955 are sand and gravel, lead, zinc, silver, gold, copper and turquoise.

Manufacturing opportunities are limited to the raw materials available. These are -- potatoes for starch and food products; grain for milling; sand and gravel for concrete products; and timber for wood products. Of the latter, the manufacture of lumber and the utilization of bulk wood offer the greatest field for expansion.

Table 3

REPORT OF TIMBER CUT AND SOLD SINCE 1915

Year	Timber Sold: No. Sales	Timber Sold: M B.F.	Timber Sold: Value	Timber Sold: Avg. Sell. Price	Timber Cut: M B.F.	Timber Cut: Value	Timber Cut: Avg. Sell. Price
1915 FY:	133	5,362	12,278	2.29	3,686	6,387	1.73
1916 FY:	198	5,254	8,489	1.62	3,123	5,355	1.71
1917 FY:	121	4,572	7,572	1.74	3,890	6,870	1.77
1918 FY:	118	12,241	21,508	1.76	3,790	6,270	1.65
1919 FY:	61	3,053	6,706	2.20	3,750	6,320	1.69
1920 FY:	165	11,620	20,815	1.81	3,346	6,485	1.94
1921 FY:	90	2,782	5,913	2.16	3,450	6,713	1.95
1922 CY:	45	4,038	9,390	2.33	2,109	4,363	2.07
1923 CY:	47	2,499	2,435	.97	2,776	7,262	2.62
1924 CY:	49	902	1,705	1.90	1,594	3,470	2.18
1925 CY:	41	1,574	3,223	2.05	1,829	3,877	2.12
1926 CY:	56	6,759	16,579	2.45	1,538	3,440	2.24
1927 CY:	47	1,198	2,149	1.79	2,495	5,809	1.53
1928 CY:	44	2,280	4,730	2.07	3,443	8,461	2.46
1929 CY:	52	4,043	9,620	2.38	2,522	7,241	2.87
1930 CY:	39	2,003	4,831	2.41	1,198	6,343	5.29
1931 CY:	36	1,070	2,553	2.39	3,513	10,004	2.85
1932 CY:	15	367	791	2.16	1,823	4,443	2.44
1933 FY:	20	420	915	2.18	902	2,036	2.26
1934 FY:	30	683	1,471	2.15	545	1,300	2.39
1935 FY:	38	1,375	2,584	1.88	1,180	2,673	2.27
1936 FY:	68	6,242	15,038	2.41	2,165	5,116	2.36
1937 FY:	51	1,163	2,684	2.31	1,864	1,864	1.99
1938 FY:	64	3,882	9,119	2.35	1,906	4,039	2.12
1939 FY:	110	1,304	2,584	1.98	1,926	4,089	2.12
1940 FY:	117	24,595	46,245	1.88	4,027	8,837	2.19
1941 FY:	113	3,138	6,526	2.08	2,436	4,936	2.03
1942 FY:	85	10,993	24,484	2.23	2,709	5,224	1.93
1943 FY:	110	1,157	2,071	1.79	2,436	4,671	1.92
1944 FY:	106	915	1,602	1.75	1,298	2,857	2.20
1945 FY:	164	2,149	4,575	2.13	2,833	5,643	1.99
1946 FY:	215	8,051	23,768	2.95	2,921	6,520	2.23
1947 FY:	191	29,361	110,877	3.78	3,864	10,323	2.67
1948 FY:	116	2,489	8,382	3.37	3,857	12,175	3.16
1949 FY:	133	3,392	7,753	2.29	3,737	10,877	2.91
1950 FY:	153	3,958	13,833	3.49	5,083	18,200	3.58
1951 FY:	133	9,803	39,723	4.05	9,567	32,945	3.44
1952 FY:	86	32,288	160,168	4.96	10,546	43,864	4.16
1953 FY:	101	4,259	25,013	5.87	16,410	75,218	4.58
1954 FY:	98	79,211	301,577	3.81	14,703	72,781	4.95
1955 FY:	90	9,067	68,251	7.53	21,887	102,852	4.70
1956 FY:		6,493	64,505	9.93	15,840	77,808	4.91
1957 FY:	58	2,180	11,908	5.46	17,240	104,861	6.08
1958 FY:	69	9,140	66,830	7.31	12,731	78,598	6.17
1959 FY:	80	18,713	22,325	1.19	24,024	142,292	5.90

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TIMBER MANAGEMENT PLAN

RIO GRANDE WORKING CIRCLE

Rio Grande National Forest
Colorado
Region 2

July 1, 1962 - June 30, 1972

Submitted: 7/27/62 By /s/ Thomas W. Sears

Reviewed and Recommended for Approval:

Forest Supervisor /s/ E. W. Stevens 7/27 1962

Division of Timber Management /s/ H. C. Eriksson (C.C.A) 8/6 1962

Engineering /s/ Boyd O. Fisher 8/10 1962

Acting Regional Forester /s/ B. K. Crane 8/14 1962

Approved: August 24, 1962

/s/ A. W. Greeley
Acting Chief

(D.J.M.)

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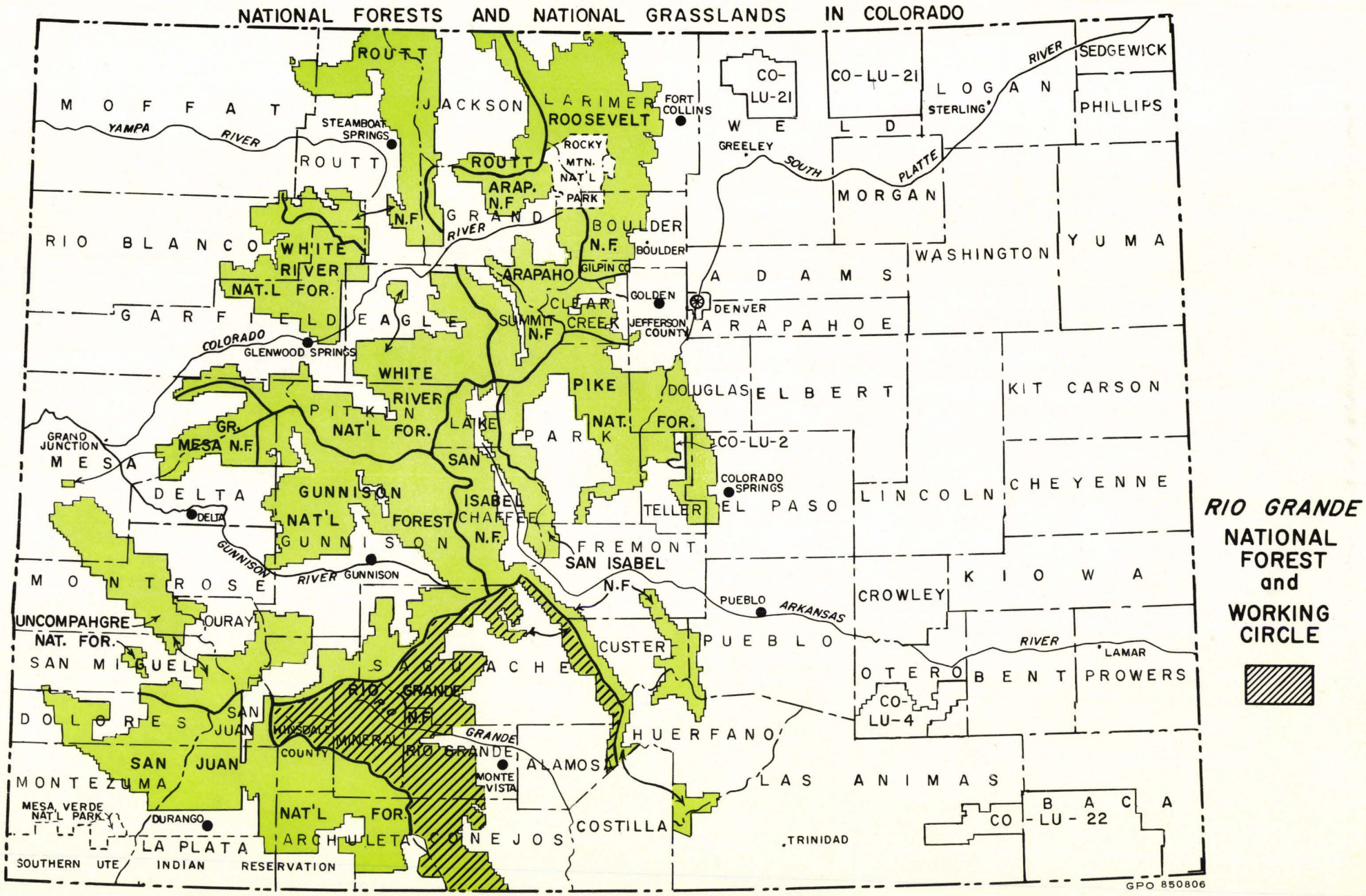

NATIONAL FORESTS AND NATIONAL GRASSLANDS IN COLORADO
ROUTT
JACKSON
LARIMER
ROOSEVELT
FORT COLLINS
CO-LU-21
CO-LU-21
SEDGEWICK
PHILLIPS
LOGAN
STERLING
RIVER
MOFFAT
YAMPA
RIVER
STEAMBOAT SPRINGS
ROUTT
ROCKY MTN. NAT'L PARK
ARAP. N.F.
GREELEY
SOUTH PLATTE
MORGAN
WELD
GRAND
RIVER
BOULDER N.F.
BOULDER
WASHINGTON
YUMA
RIO BLANCO
WHITE RIVER NAT.L FOR.
ARAPAHO
GILPIN CO
ADAMS
GOLDEN
DENVER
CLEAR CREEK
JEFFERSON COUNTY
ARAPAHOE
GARFIELD
EAGLE
SUMMIT N.F
COLORADO
GLENWOOD SPRINGS
WHITE RIVER
PIKE NAT. FOR.
DOUGLAS
ELBERT
KIT CARSON
PITKIN
GRAND JUNCTION
GR. MESA N.F.
NAT'L FOR.
LAKE
PARK
CO-LU-2
MESA
SAN
COLORADO SPRINGS
DELTA
GUNNISON
ISABEL
TELLER
EL PASO
LINCOLN
CHEYENNE
DELTA
NAT'L
FOREST
CHAFFEE
GUNNISON
N.F.
FREMONT
SAN ISABEL
GUNNISON RIVER
GUNNISON
MONTROSE
N.F.
KIOWA
CROWLEY
PUEBLO
ARKANSAS
UNCOMPAHGRE
NAT. FOR.
OURAY
CUSTER
PUEBLO
RIVER
LAMAR
SAN MIGUEL
SAGUACHE
OTERO
BENT
PROWERS
RIO GRANDE N.F.
CO-LU-4
DOLORES
SAN JUAN
HINSDALE COUNTY
MINERAL
RIO GRANDE
HUERFANO
SAN JUAN
RIO GRANDE
MONTE VISTA
ALAMOSA
MONTEZUMA
LAS ANIMAS
MESA VERDE NAT'L PARK
DURANGO
NAT'L FOR.
CO-LU-22
BACA
LA PLATA
ARCHULETA
CONEJOS
COSTILLA
TRINIDAD
SOUTHERN UTE INDIAN RESERVATION
RIO GRANDE
NATIONAL FOREST and WORKING CIRCLE
GPO 850806

SUMMARY OF PLAN

Table 1

Annual Allowable Harvest Cut

Type	Area Acres	Yield: Cubic Feet M C. F.	Yield: Board Feet Scrib.Dec.C MM B.F.	Yield: Board Feet Int.$\frac{1}{4}$" MM B.F.
Douglas-fir Sawtimber	460	600	1.9	2.4
Ponderosa Pine Sawtimber	800	480	1.5	1.9
Lodgepole Pine Sawtimber	250	500	1.2	1.6
Spruce-Fir Sawtimber	5,100	15,000	56.0	67.0
Total	6,610	16,580	60.6	72.9

Yield By Species

Species	Sawtimber Types*: Douglas-fir M B.F.	Ponderosa Pine M B.F.	Lodgepole Pine M B.F.	Spruce-Fir M B.F.	Total M B.F.
Douglas-fir	1,500	430	100	400	2,430
Ponderosa Pine	80	950	--	--	1,030
Lodgepole Pine	--	20	1,100	200	1,320
White Fir	300	100	--	--	400
Subalpine Fir	--	--	--	6,600	6,600
Engelmann Spruce	90	--		48,800	48,890
Total	1,970	1,500	1,200	56,000	60,670

*Board foot volume based on Scribner Decimal C log rule.

Table 2

Total Volume In Unregulated Types

Type	Area M Acres	Total Volume
Lodgepole Pine Poletimber	16	14,162 M C.F.
Aspen Poletimber	200	202,560 M C.F.

Table 3

Area Summary By Ownership, Land Classification
And Stand Size Class

Thousand Acres

Land Classification	National Forest	State and County	Private	Total
Commercial Forest Land				
Unreserved				
Small Sawtimber	565	1	13	579
Poletimber	333	1	10	344
Seedling-Sapling	46		2	48
Nonstocked	29			29
Subtotal	973	2	25	1,000
Reserved				
Productive	47	-	-	47
Nonproductive	12	-	-	12
Nonforest	43	-	-	43
Subtotal	102	-	-	102
Noncommercial	218	1	10	229
Nonforest	560	4	70	634
Grand Total	1,853	7	105	1,965

Table 4

Area of Commercial National Forest Land
By Type, Stand Size Class and Stocking Class

M Acres

Type	Small Sawtimber			Poletimber				Seedling-Sapling					
	Med.	Poor	Total	Well	Med.	Poor	Total	Well	Med.	Poor	Total	Nonstocked	Total
Douglas-fir	26	64	90	27	19	2	48						138
Ponderosa Pine	1	48	49		3	2	5						54
Lodgepole Pine	7	9	16	11	5		16	4			4		36
White Pine Group		7	7	2	9	1	12						19
Spruce-Fir	248	150	398	16	24	15	55		1	3	4	30	487
Total Conifers			560				136				8	30	734
Aspen			4				197				38		239
Grand Total			564				333				46	30	973

Table 5

Total Volume For Commercial Forest Lands
By Ownership and Species Group

Species Group and Ownership	Cubic Feet		Board Feet	
	Trees 5.0-10.9"D.B.H.	Trees 11.0"+ D.B.H.	Trees 9.0"D.B.H. & Larger	
			Int. ¼"	Scrib.Dec.C
	MM C.F.	MM C.F.	MM B.F.	MM B.F.
Softwood Types				
National Forest	535	924	5,974	4,946
State and County	-	1	3	3
Private	10	15	90	74
Total	545	940	6,067	5,023
Hardwood Types				
National Forest	176	33		
State and County		1		
Private	5	1		
Total	181	35		
Grand Total				
National Forest	711	957	5,974	4,946
State and County	-	2	3	3
Private	15	16	90	74
Total	726	975	6,067	5,023

Table 6

Summary of Total Area, Net Volume Per Acre and Total Volume By Species
For Major Sawtimber Types - National Forest Unreserved Lands
Scribner Dec. C Log Rule - Trees 9.0 Inches D.B.H. and Larger

Type	Area Acres	Volume Per Acre Bd. Ft.	Species											
			Douglas-fir	Ponderosa Pine	Lodgepole Pine	White Pine Group	White Fir	Sub-alpine Fir	Engelmann Spruce	Blue Spruce	Aspen	Total	Percent
			MM Bd. Ft.										
Douglas-fir	89,423	4,233.24	246	13		39	49	1	15	7	9	379	7.69
Ponderosa Pine	49,250	1,893.30	27	56	1	2	6			1		93	1.89
Lodgepole Pine	16,030	4,789.62	8		69							77	1.56
Spruce-Fir	398,634	10,979.40	32		14	16		506	3,743	49	17	4,377	88.85
Total	553,337		313	69	84	57	55	507	3,758	57	26	4,926	100.00
Percent			6.35	1.40	1.70	1.16	1.12	10.29	76.29	1.16	0.53	100.00	-

Table 7

Periodic Annual Net Growth Based on Past 10 Years
By Major Types and Kind of Volume

Type	Area Acres	Volume Per Acre: Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet CF	Total Annual Growth By Type: Int. ¼" MBF	Scrib. Dec. C MBF	Cubic Feet MCF
Sawtimber							
Douglas-fir	89,423	7.40	6.34	2.05	662	567	183
Ponderosa Pine	49,250	2.88	2.44	0.80	142	120	39
Lodgepole Pine	16,030	1.17	1.02	0.22	18	16	4
Spruce-Fir	398,634	53.64	46.83	12.03	21,383	18,668	4,796

Table 8

Recommended Rotation and Adjustment Periods

Type	Adjustment Period Years	Rotation Years
Douglas-fir	50	140
Ponderosa Pine	50	140
Lodgepole Pine	50	120
Spruce-Fir	50	140

Revision Date June 30, 1972

TIMBER MANAGEMENT PLAN

RIO GRANDE WORKING CIRCLE

RIO GRANDE NATIONAL FOREST

INTRODUCTION

This working circle plan is a 10-year action program. The plan prescribes the action necessary to meet the long-term objectives in the General Timber Management Statement for the Rio Grande National Forest.

This plan will be revised by June 30, 1972, or sooner, if necessary to meet changing conditions.

Detailed Forest Survey data from which this plan was formulated are found on the IBM sheets labeled, "1961, Forest Survey, Colorado, IBM Sheets, Rio Grande National Forest, Sample Unit 23," and filed in the office of the Forest Supervisor at Monte Vista, Colorado.

Atlas binders containing compartment records and maps with compartment descriptions, including area and volume breakdown by types, are kept in the rangers' offices. These records will be kept current for action taken within the compartments.

SUMMARY OF RESULTS UNDER PREVIOUS PLANS

Prior to 1957 there were six working circles on the forest, as described in the General Management Statement. The last revision of the plan, in 1948, set an allowable cut of 33 million board feet. In 1957 an interim allowable cut of 28.8 million board feet was established.

During the period 1952-1961, the Rio Grande Working Circle's actual cut was 55 percent of the allowable cut. The actual cut was less than the allowable cut due to the lack of timber access roads and demand for timber.

A graphic comparison of the actual and allowable cut is shown in Chart 1.

Timber Stand Improvement and Reforestation Accomplishments

1. Artificial Regeneration

   a. Planting - Satisfactory survival has been obtained on 995 acres. Engelmann spruce has been the principal species planted.

   b. Seeding - Direct seeding was tried on 500 acres. Satisfactory survival was obtained on 45 acres.

2. Thinning - Noncommercial

   During the period of 1959 to 1961, 328 acres of various types have been noncommercially thinned.

Protection Accomplishments

1. Disease Control

   Dwarfmistletoe control on ponderosa pine was accomplished on 146 acres.

2. Fire Control

   During the period of 1952 through 1961, a total of 141 fires burned 1,294 acres. Two of these fires exceeded 300 acres; four were between 10 and 64 acres; and the remainder were under 10 acres.

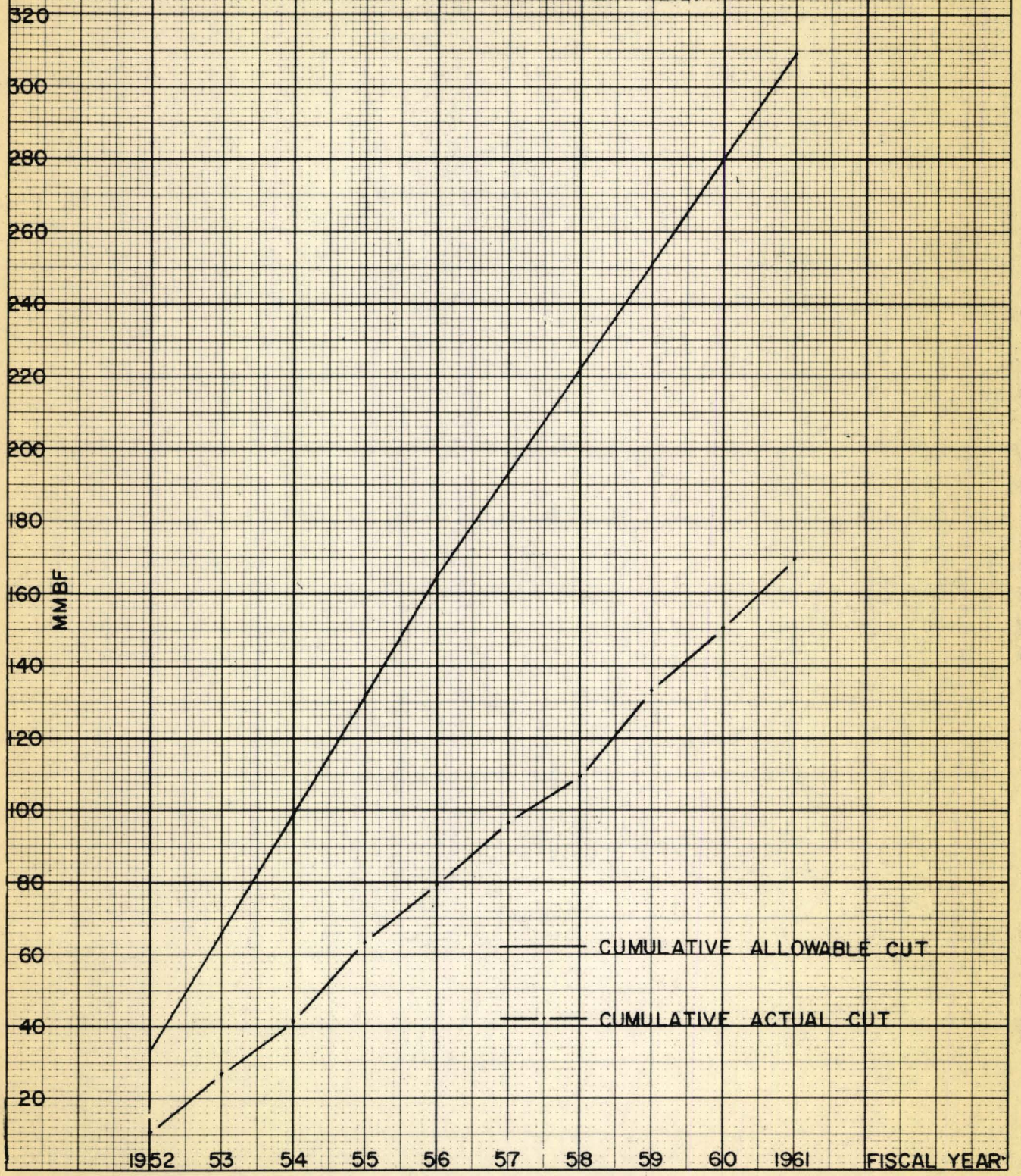
Area Put In Good Growing Condition

About 10,000 acres have been put into good growing condition through regeneration cuttings and timber stand improvement work.

Chart 1

COMPARISON OF CUMULATIVE TOTAL ALLOWABLE CUT WITH ACTUAL CUT

FISCAL YEARS 1952 - 1961



MANAGEMENT OBJECTIVES

The objective of this plan is to provide a program for the 10-year period that will enable the accomplishment of the objectives in the General Timber Management Statement by the year 2000 A.D.

In general, the objectives for the next 10 years will be:

1. Attain the annual allowable cut for the working circle by F.Y. 1972. The actual cut will need to be greatly increased to meet this objective. To do this will require increasing the capacity of existing mills and establishing new industry, such as a plywood plant or pulp mill.

2. Bring cutover areas up to adequate levels of stocking within three years following cutting. Approved methods of ground preparation and reforestation will be applied to insure adequate stocking.

3. Work with timber purchasers to develop improved logging and transportation techniques for harvesting areas now inoperable.

4. Examine the 29,000 acres of nonstocked types and establish a program to reforest one-half the plantable area within the current 10-year period.

5. Of the 239,000 acres of aspen type, determine those suitable for re-establishment of coniferous types. Schedule half the reforestation needs for the current 10-year period.

6. Prevent the occurrence of epidemics of destructive forest insects.

7. Keep the amount of commercial forest acreage damaged by fire within the PAR of 30 acres per year as set forth in the forest's fire prevention plan.

REGULATION

Regulation will be by area, with the allowable cut expressed in both area and volume. Control will be by 10-year periods. Undercuts that have built up during the period may be cut during the remainder of the same period, provided that the total cumulative cut does not exceed the allowable periodic cut by more than 10 percent. The control of the allowable cut will be by type area and not by species or products cut within the type. Sales programs will be by species and products and will be in volumes sufficient to meet area control objectives; otherwise the average annual cut will fall short of meeting the 10-year objective. Emphasis will be placed on increasing the current actual cut until experience shows the allowable cut objectives are assured.

The financed cut for any one year is based upon volume and includes the cut from both the regulated and unregulated areas. The financed cut quota should be sufficient to meet both volume and area objectives for the forest as a whole. If the present relationship between area and volume is found to be out of proportion for the forest as a whole, the volume will be adjusted to be consistent with area regulation. No adjustment, however, will be made prior to the end of the first five-year period.

Types To Be Regulated

The major sawtimber type is spruce-fir with lesser acreages of Douglas-fir, ponderosa pine and lodgepole pine types. All these types are regulated in this plan.

The markets for round wood products and aspen are uncertain or nonexistent, hence the coniferous poletimber and the aspen types are not regulated.

Rotations

The allowable cut in previous plans was based on rotations of 160 years. In this plan an adjustment period of 50 years is used for the regulated types. This adjustment period is used for the conversion of overaged virgin stands into managed stands, and to reduce losses of overmature timber due to insects and disease.

Growth and mortality are to be re-examined at 10-year intervals. If substantial increases occur in mortality, the adjustment periods will be subject to change.

Rotation ages of 120 years for lodgepole pine and 140 years for ponderosa pine, Douglas-fir and spruce-fir are used in this plan for application in the Kemp formula.

Method of Cutting

Region 2's Management Guides for Ponderosa Pine and for Engelmann Spruce and Associated Species, FSH2-2442.8, will be applied in designating timber for harvesting. These guides provide for clear cutting by patches, strips or groups with even-age management as the objective.

Timber management within roadsides, recreation areas, streamsides and waterfronts will be for the purpose of protecting, improving and maintaining stands of timber that will be adequate for the use to be made of the area.

Timber cutting within established recreation areas will be in accordance with the objectives set up in the recreation plan for the specific area.

Presale prescriptions will establish the requirements for each sale in accordance with directions in the Multiple-Use Management Guides for Western Colorado, and Forest and Ranger District plans.

It is essential that a good timber management job be done in order to maintain good esthetics in areas used by the general public. A complete slash disposal job will be accomplished immediately after logging in the special treatment areas. This may be by piling and burning, chipping, or other approved methods.

The Regional Forester and Forest Supervisor are authorized to make sales within their authorizations within the roadside zones of system roads, including Highway U. S. 160.

Growing Stock

The forest inventory divides the major timber types into stand size classes and stocking classes. The definitions for these classes are Forest Survey standards.

Stand Size Classes

Sawtimber. Stands that have an average net volume per acre of 1,500 board feet (International $\frac{1}{4}$" log scale) or more in trees 11.0" and larger d.b.h.

Poletimber. Stands failing to meet sawtimber specifications but at least 10 percent stocked with poletimber size trees and larger (5.0" + d.b.h.). The plurality of cubic foot volume is in trees 5.0"-10.9" d.b.h.

Seedling-Saplings. Stands that do not qualify as either poletimber or sawtimber stands but are at least 10 percent stocked with commercial species 1.0"-4.9" d.b.h.

Nonstocked. Stands that do not meet any of the above qualifications, i.e., normally less than 10 percent stocked.

Tree Size Classes

Sawtimber - Trees 11.0"+ d.b.h.

Poletimber- Trees 5.0"-10.9" d.b.h.

Seedling-Sapling - Trees 1.0"-4.9" d.b.h.

Sawtimber inventory volumes as used in this plan are in trees 9.0"+ d.b.h. in the sawtimber type.

Stocking class or crown density class refers to the extent to which growing space is utilized by present growing stock trees of commercial species. The classification is based on the percent of crown closure. The stocking classes for sawtimber stands, as used in this plan, are for the percent of closure of sawtimber crowns. The stocking classes for poletimber and seedling-sapling stands are based on crown closure for all trees, regardless of their size.

Classification	Percent of Crown Closure
Nonstocked	0 to 9
Poorly Stocked	10 to 39
Medium Stocked	40 to 69
Well Stocked	70+

Condition classes were not used in the survey.

Table 9 summarizes the distribution of the stand size classes for the four regulated types.

Sawtimber size types represent 78 percent of the area. Poletimber and seedling-sapling size types comprise 18 percent of the area, with four percent being nonstocked.

The operability factors were obtained by excluding steep slopes (70 percent +), areas adjacent to timberline, and poorly stocked steep, rocky slopes. For the latter two categories, the poor quality of the timber makes it unmerchantable.

Growth and Mortality

Growth and mortality are based on Forest Survey data. The calculation is explained under "Supporting Data." Table 10 shows the growth and mortality for the sawtimber types. The net annual growth is 34.8 board feet, Scribner Decimal C per acre for all sawtimber types, based on the past 10 years.

The total annual net growth and mortality for the sawtimber type is:

Kind of Volume	Total Annual Net Growth Per Acre	Total Annual Mortality Per Acre
Board Feet		
Scribner Decimal C	34.76	6.33
International $\frac{1}{4}$"	39.84	7.42
Cubic Feet	9.01	1.74

The primary causes of mortality are insects and disease. Since much of the sawtimber is overaged, mortality from these sources will likely increase until the timber is harvested.

Empirical yield tables are not available as no experience has been built up on what can be expected under management. Potential growth can be increased to a range of 40 to 100 cubic feet per acre annually depending upon the site.

Table 9

Distribution of Stand Size Classes
For
Regulated Types

Stand Size Class	Douglas-fir Type			Ponderosa Pine Type			Lodgepole Pine Type			Spruce-Fir Type		
	M Acres	Percent of Type	Percent Operable	M Acres	Percent of Type	Percent Operable	M Acres	Percent of Type	Percent Operable	M Acres	Percent of Type	Percent Operable
Sawtimber	90	65.0	25	49	90.7	80	16	44.4	80	399	81.9	60
Poletimber	48	35.0		5	9.3		16	44.5		55	11.3	
Seedling-Sapling	-			-			4	11.1		4	0.8	
Nonstocked	-			-			-			29	6.0	-
Total	138	100.0	-	54	100.0	-	36	100.0	-	487	100.0	-

Table 10

Average Ten-Year Adjusted Gross Increment, Mortality
And Periodic Annual Net Growth Per Acre By Species

Sawtimber Stands

Species	Int. ¼" 10-Year Gross Growth	Int. ¼" 10-Year Mortality	Int. ¼" Annual Net Growth	Scrib. Dec. C 10-Year Gross Growth	Scrib. Dec. C 10-Year Mortality	Scrib. Dec. C Annual Net Growth	Cubic Feet 10-Year Gross Growth	Cubic Feet 10-Year Mortality	Cubic Feet Annual Net Growth
	BF	BF	BF	BF	BF	BF	CF	CF	CF
Douglas-fir	79.28	10.97	+ 6.83	67.48	9.07	+ 5.84	23.72	2.93	+ 2.08
Ponderosa Pine	22.58	9.09	+ 1.35	18.70	7.16	+ 1.15	4.81	1.99	+ 0.28
Lodgepole Pine	10.84	4.89	+ 0.60	8.82	3.99	+ 0.48	3.48	2.42	+ 0.11
White Pine Group	14.77	--	+ 1.48	12.43	--	+ 1.24	4.60	0.53	+ 0.41
White Fir	6.42	--	+ 0.64	5.88	--	+ 0.59	2.10	0.03	+ 0.21
Subalpine Fir	115.25	270.39	-15.51	98.74	232.29	-13.35	38.90	64.36	- 2.55
Engelmann Spruce	729.60	79.98	+64.95	633.69	68.47	+56.52	167.69	16.89	+15.08
Blue Spruce	18.92	10.46	+ 0.85	16.07	8.78	+ 0.73	4.19	1.99	+ 0.22
Aspen	8.54	3.43	+ 0.51	7.12	2.72	+ 0.44	8.81	8.79	--
Total	1,006.20	389.21	+61.70	868.93	332.48	+53.64	258.30	99.93	+15.84

Calculation of Allowable Cut

Douglas-fir Type

Within the working circle there are 90,000 acres of Douglas-fir sawtimber size stands. The majority of these existing stands are overmature, and are the remnants of early day logging. They were left because of poor stocking, excessive defect and poor accessibility. It is estimated that 75 percent of the type is inoperable due to the steep, rocky slopes on which the type occurs and the poor quality of the trees, excessive limbs and shake.

Table 11 shows the allowable cut in cubic feet for each 10-year period for the 50-year adjustment period. An equal volume of timber to be cut was set up for each period. Growth was calculated to the midpoint of the period. The area was then adjusted to reflect the total volume.

The allowable annual cut for the first 10-year period is:

Area - 460 Acres
Volume - 600 M Cubic Feet

The cubic foot volume is converted to board feet by using the following converting factors:

Cubic feet to Scribner Decimal C = 3.17
Cubic feet to International $\frac{1}{4}$" = 3.93

$$\frac{\text{Scribner Decimal C}}{\text{600 M C.F. x 3.17}} = \text{1,900 M B.F. per year.}$$

$$\frac{\text{International } \frac{1}{4}\text{"}}{\text{600 M C.F. x 3.93}} = \text{2,358 M B.F. per year.}$$

The comparison with other area calculations is as follows:

a. Straight area calculation based on rotation age --

$$\frac{\text{138,000 acres}}{\text{140 years}} = \text{986 acres per year.}$$

246 operable acres per year x 1,345 C.F. per acre = 331 M C.F. per year.

b. Area in sawtimber divided by the adjustment period of 50 years --

$$\frac{\text{22,500 operable acres}}{\text{50 years}} = \text{450 acres per year.}$$

450 acres x 1,345 C.F. per acre = 605 M C.F. per year.

c. The Kemp formula gives --

$$\frac{(90{,}000 \times 7) + (48{,}000 \times 5)}{4 \times 140 \text{ years}} = 1{,}550 \text{ acres per year.}$$

1,550 x .25 (O.F.) = 388 acres per year.
388 acres x 1,345 C.F. per acre = 522 M C.F. per year.

The volume by species to be cut from the 460 acres of Douglas-fir sawtimber type is estimated to be as follows:

Species	Percent	Volume M B.F.
Douglas-fir	76.1	1,500
Ponderosa Pine	4.0	80
White Fir	15.1	300
Engelmann Spruce	4.8	90
Total	100.0	1,970

Ponderosa Pine Type

The 49,000 acres of ponderosa pine sawtimber comprise 91 percent of the entire type. Of the sawtimber type, the largest amount, 97 percent, is poorly stocked. Being at lower elevations the type is generally accessible and has been largely cut over. The present stands are characterized by low volumes, poor growth, and few stems per acre in sawtimber and smaller size trees. Eighty percent or 39,000 acres are estimated to be operable.

Regulation of the type will be based on an adjustment period of 50 years. Primary reasons for the short adjustment period are the poor growth and potential damage by insects and disease. Presently growth is at 2.44 board feet per acre annually. Stands are infested with Black Hills beetle and dwarfmistletoe.

The allowable annual cut by area and volume as determined by a tabulation method is shown in Table 11.

The allowable annual cut for the first 10-year period is:

Area - 800 Acres
Volume - 480 M Cubic Feet

The cubic foot annual allowable cut is converted to board feet by using the following converting factors:

Cubic feet to Scribner Decimal C = 3.13
Cubic feet to International $\frac{1}{4}$" = 4.06

$$\frac{\text{Scribner Decimal C}}{\text{480 M C.F. x 3.13}} = \text{1,500 M B.F. per year.}$$

$$\frac{\text{International } \frac{1}{4}\text{"}}{\text{480 M C.F. x 4.06}} = \text{1,950 M B.F. per year.}$$

The comparison with other area calculations is as follows:

a. Straight area calculation based on rotation age --

$$\frac{\text{54,000 acres}}{\text{140 years}} = \text{385 acres per year.}$$

308 operable acres per year x 609 C.F. per acre = 188 M C.F. per year.

b. Area in sawtimber divided by the adjustment period of 50 years is --

$$\frac{\text{39,000 operable acres}}{\text{50 years}} = \text{780 acres per year.}$$

780 acres per year x 609 C.F. per acre = 475 M C.F. per year.

c. The Kemp formula gives --

$$\frac{(\text{49,000 x 7}) + (\text{5,000 x 5})}{\text{4 x 140 years}} = \text{660 acres per year.}$$

660 acres per year x .80 (O.F.) x 609 C.F. per acre = 528 M C.F. per year.

The volume by species to be cut annually from the 800 acres of ponderosa pine is estimated to be as follows:

Species	Percent	Volume M B.F.
Douglas-fir	28.9	430
Ponderosa Pine	62.9	950
Lodgepole Pine	1.0	20
White Fir	7.2	100
Total	100.0	1,500

Lodgepole Pine Type

The 16,000 acres of lodgepole pine sawtimber type are located in the northern end of the working circle in the Saguache Block. Of this type, 12,800 acres, or 80 percent, is estimated to be operable.

Regulation of this type is based on an adjustment period of 50 years. The estimated growth in this type is only 1.02 board feet per acre.

The allowable annual cut by area and volume as determined by a tabulation method is shown in Table 11.

The allowable annual cut for the first 10-year period is:

Area - 250 Acres
Volume - 500 M Cubic Feet

The cubic foot allowable cut is converted to board feet by using the following converting factors:

Cubic feet to Scribner Decimal C = 2.40
Cubic feet to International $\frac{1}{4}$" = 3.14

$$\frac{\text{Scribner Decimal C}}{\text{500 M C.F. x 2.40}} = \text{1,200 M B.F. per year.}$$

$$\frac{\text{International } \frac{1}{4}\text{"}}{\text{500 M C.F. x 3.14}} = \text{1,570 M B.F. per year.}$$

The comparison with other area calculations is as follows:

a. Straight area calculations based on rotation age --

$$\frac{\text{36,000 acres}}{\text{120 years}} = \text{300 acres per year.}$$

240 operable acres per year x 1,990 C.F. = 478 M C.F. per year.

b. Area in sawtimber divided by adjustment period of 50 years is --

$$\frac{\text{12,800 op.acres}}{\text{50 years}} = \text{256 acres per year.}$$

256 acres x 1,990 C.F. = 509 M C.F. per year.

c. The Kemp formula gives --

$$\frac{(16{,}000 \times 7) + (16{,}000 \times 5) + (4{,}000 \times 3)}{4 \times 120 \text{ years}} = \text{425 acres per year.}$$

425 acres x .80 (O.F.) = 340 acres per year.

340 acres x 1,990 C.F. = 677 M C.F. per year.

The volume by species to be cut from the 250 acres of lodgepole pine is estimated to be as follows:

Species	Percent	Volume M B.F.
Douglas-fir	10	100
Lodgepole Pine	90	1,100
Total	100	1,200

Spruce-Fir Type

The spruce-fir type covers 487,000 acres, by far the most extensive type in the working circle. The sawtimber size class includes 398,000 acres, or 82 percent, of the total spruce-fir type. Site tree data indicates that 72 percent of the sawtimber size stands are past rotation age. Sixty percent of this area, or 238,800 acres, are considered operable.

Due to the overaged condition, the heavy populations of bark beetles, and the virgin condition of timber, a 50-year adjustment period is used as the basis for regulation. The oldest stands, which are particularly susceptible to insect infestations, will be harvested first to minimize losses. A constant program of detection and control will be required to prevent the occurrence of bark beetle epidemics.

The annual net increment for this type amounts to 46.83 board feet, the highest of the sawtimber types in the working circle.

The allowable annual cut by area volume as determined by a tabulation method is shown in Table 11.

The allowable annual cut for the first 10-year period is:

Area - 5,100 Acres
Volume - 15,000 M Cubic Feet

The cubic foot allowable cut is converted to board feet by using the following converting factors:

Cubic feet to Scribner Decimal C = 3.73
Cubic feet to International $\frac{1}{4}$" = 4.48

$$\frac{\text{Scribner Decimal C}}{\text{15,000 M C.F. x 3.73}} = \text{56,000 M B.F. per year.}$$

$$\frac{\text{International } \frac{1}{4}\text{"}}{\text{15,000 M C.F. x 4.48}} = \text{67,000 M B.F. per year.}$$

The comparison with other area calculations is as follows:

a. Straight area calculations based on rotation age --

$$\frac{487{,}000 \text{ acres}}{140 \text{ years}} = 3{,}478 \text{ acres per year.}$$

2,087 operable acres x 3,006 C.F. = 6,273 M C.F. per year.

b. Area in sawtimber divided by the adjustment period of 50 years is --

$$\frac{238{,}800 \text{ operable acres}}{50 \text{ years}} = 4{,}776 \text{ acres per year.}$$

4,776 acres x 3,006 C.F. = 14,357 M C.F. per year.

c. The Kemp formula gives --

$$\frac{(398{,}000 \times 7) + (55{,}000 \times 5) + (4{,}000 \times 3) + 30{,}000}{4 \times 140 \text{ years}} = 5{,}540 \text{ acres per year.}$$

3,324 operable acres x 3,006 C.F. = 9,992 M C.F. per year.

The volume by species to be cut from the 5,100 acres of spruce-fir type is estimated to be as follows:

Species	Percent	Volume M B.F.
Douglas-fir	0.7	400
Lodgepole Pine	0.3	200
Subalpine Fir	11.8	6,600
Engelmann Spruce	87.2	48,800
Total	100.0	56,000

Allowable Cut Beyond the Adjustment Period

At the end of the 50-year period, the amount of sawtimber area will be greatly reduced. The effect of this will be to reduce the allowable cut. Tending to balance out this reduction, however, will be the intensified management of the forest. The result will be an allowable cut approximating the present one.

Since over 75 percent of the coniferous stands are of sawtimber size and overaged, there appears to be no other alternative. It is a matter of either harvesting the timber and getting a new crop started or letting insects and disease do the job.

Table 11

Periodic Allowable Cut
Yield In Cubic Feet

10-Year Periods	Sawtimber Types	Periodic Allowable Cut	Yield: Average Net Volume p/acre: Beginning of Period	Net Growth Midpoint	Total	Total Volume For Period M C.F.
1st	Douglas-fir	4,600	1,336	10	1,346	6,000
	Ponderosa Pine	8,000	605	4	609	4,800
	Lodgepole Pine	2,500	1,993	1	1,994	5,000
	Spruce-Fir	51,000	2,946	60	3,006	150,000
2nd	Douglas-fir	4,500	1,356	10	1,366	6,000
	Ponderosa Pine	7,900	613	4	617	4,800
	Lodgepole Pine	2,500	1,995	1	1,996	5,000
	Spruce-Fir	50,000	3,066	60	3,126	150,000
3rd	Douglas-fir	4,500	1,376	10	1,386	6,000
	Ponderosa Pine	7,800	621	4	625	4,800
	Lodgepole Pine	2,500	1,997	1	1,998	5,000
	Spruce-Fir	48,000	3,186	60	3,246	150,000
4th	Douglas-fir	4,400	1,396	10	1,406	6,000
	Ponderosa Pine	7,700	629	4	633	4,800
	Lodgepole Pine	2,500	1,999	1	2,000	5,000
	Spruce-Fir	46,000	3,306	60	3,366	150,000
5th	Douglas-fir	4,300	1,416	10	1,426	6,000
	Ponderosa Pine	7,600	637	4	641	4,800
	Lodgepole Pine	2,500	2,001	1	2,002	5,000
	Spruce-Fir	44,000	3,426	60	3,486	150,000
Total Area	Douglas-fir	22,300				
	Ponderosa Pine	39,000				
	Lodgepole Pine	12,500				
	Spruce-Fir	239,000				

The various factors increasing the area and volume available will be ingrowth of poletimber, growth of existing sawtimber, and timber stand improvement methods that will improve growth and quality and convert non-productive to productive areas.

The distribution of age classes will be improved by cutting the overmature sawtimber stands. It is estimated that the distribution of stand size classes at the end of the adjustment period will be as follows:

	Type			
	Spruce-Fir		All Regulated	
	Acres		Acres	
Stand Size Class	1962	2012	1962	2012
Sawtimber	399,000	220,000	553,000	355,000
Poletimber	55,000	174,000	124,000	251,000
Seedling-Sapling	4,000	107,000	8,000	128,000
Nonstocked	29,000	8,000	29,000	10,000
Total	487,000	509,000	714,000	744,000

The Kemp formula using the above data gives an allowable cut for the year 2012 of 7,360 acres for all regulated types. The present allowable cut calculated from the Kemp formula amounts to 3,743 acres. Should the current operability factors be about the same at that time, the acreage would be similar.

Volume In Unregulated Types

White Pine Group - There are 19,000 acres in this type of which 7,000 acres are classed as sawtimber size. The average volume per acre is 2,735 board feet or a total of 14,960 M B.F. Much of the sawtimber size class is inoperable because of poor stocking, poor site, and poor quality. Due to these conditions, harvest of the type will be insignificant.

Aspen - There are 239,000 acres of aspen type of which only 4,000 acres are in sawtimber. The average volume per acre is 872 cubic feet. The total volume is 208,607 M C.F. or 2,500 M cords. At present there are no markets for this species and none are expected to develop in the next 10 years.

Cutting Budget

The cutting budget for this period is shown in Table 12. The basis for selection of the compartments budgeted for cutting was the condition and age of the sawtimber stands. Selected areas are distributed over the working circle to facilitate the orderly harvest of the working circle. Communities with, or capable of supporting, a sawmill industry are within a reasonable distance of the areas budgeted.

It is very questionable if the average annual cut can be increased from 18 million board feet to 60 million board feet during the next 10 years. The availability of road funds will be the controlling factor.

Considering the allocation of road funds in the past and what can be expected in the near future, a 40 million foot cut seems more realistic and the cutting budget is based on such. As more road funds become available the cutting budget will be adjusted accordingly.

Table 12

Cutting Budget

F.Y. 1963 - 1972

Compartment			Gross	Douglas-fir Sawtimber Type		Ponderosa Pine Sawtimber Type		Lodgepole Pine Sawtimber Type		Spruce-Fir Sawtimber Type		Total
Name	No.	Ranger District	Sawtimber Area In Compartment	Net Area Acres	Volume MM B.F.	Net Area Acres	Volume MM B.F.	Net Area Acres	Volume MM B.F.	Net Area Acres	Volume MM B.F.	Volume MM B.F.
Timber Under Contract But Uncut As Of June 30, 1962												
Los Pinos	3	Conejos	9,033							470	7	7
Treasure	23	Alamosa	6,465							750	14	14
Beaver	37	Del Norte	17,445							370	5	5
Park	39	Del Norte	16,935							890	16	16
Pass	40	Del Norte	11,550							130	2	2
Trout	53	Creede	15,408							320	5	5
Carnero	79	Alder	10,385							290	4	4
Total										3,220	53	53
Proposed Offerings												
Houselog	81	Saguache	12,565			500	1					1
Kerber	92	Saguache	8,872					1,280	6			6
Alder	72	Alder	10,860							100	1	1
Treasure	23	Alamosa	6,465							1,280	9	9
Alder	72	Alder	10,860							250	2	2
Pass	40	Del Norte	11,550							1,050	19	19
California	83	Saguache	9,745							800	8	8
Treasure	23	Alamosa	6,465							910	14	14
Hot Creek	19	Alamosa	7,245	460	2							2
Cave	78	Alder	12,445							300	3	3
Saddle	12	Conejos	1,910							300	6	6
Lake	16	Alamosa	2,799							1,200	21	21
LaManga	8	Conejos	4,560							1,500	18	18
Deep	50	Creede	14,270							1,650	9	9
LaGarita	77	Alder	10,895							800	8	8

(Table Continued)

Table 12 (Continued)

Cutting Budget

F.Y. 1963 - 1972

Compartment			Gross	Douglas-fir Sawtimber Type		Ponderosa Pine Sawtimber Type		Lodgepole Pine Sawtimber Type		Spruce-Fir Sawtimber Type		Total
Name	No.	Ranger District	Sawtimber Area In Compartment	Net Area Acres	Volume MM B.F.	Net Area Acres	Volume MM B.F.	Net Area Acres	Volume MM B.F.	Net Area Acres	Volume MM B.F.	Volume MM B.F.
Lower Conejos	7	Conejos	4,220	460	2	500	1					3
Trout	53	Creede	15,408							1,600	24	24
Beaver	37	Del Norte	17,445							3,600	38	38
Three Forks,	13,	Alamosa	)									
Adams &	14,	Alamosa	)									
Platoro	15	Alamosa	) 9,761							1,240	70	70
Archuleta	71	Conejos	3,240							1,100	15	15
Sheep	89	Saguache	20,575							520	6	6
Hot Creek	19	Alamosa	7,245	460	2	500	1					3
LaGarita	77	Alder	10,895							700	7	7
Chama	2	Conejos	2,855							1,100	15	15
Fox	6	Conejos	4,540			1,000	2					2
Ivy	51	Creede	4,635							980	9	9
Poison	45	Del Norte	8,760							1,000	14	14
Johns	84	Saguache	2,194							1,200	14	14
Treasure	23	Alamosa	6,495							560	10	10
Hot Creek	19	Alamosa	7,245	460	2							2
Platoro, Jasper,	15,22	Alamosa	)									
Telluride	25	Alamosa	) 8,550							730	12	12
Saddle	12	Conejos	1,910							760	10	10
Red	52	Creede	4,415							650	6	6
Burro	32	Del Norte	7,405							1,850	26	26
Spruce	41	Del Norte	7,070							2,650	38	38
Platoro	15	Alamosa	3,945							340	6	6

(Table Continued)

Table 12 (Continued)

Cutting Budget

F.Y. 1963 - 1972

Compartment			Gross	Douglas-fir Sawtimber Type		Ponderosa Pine Sawtimber Type		Lodgepole Pine Sawtimber Type		Spruce-Fir Sawtimber Type		Total
Name	No.	Ranger District	Sawtimber Area In Compartment	Net Area Acres	Volume MM B.F.	Net Area Acres	Volume MM B.F.	Net Area Acres	Volume MM B.F.	Net Area Acres	Volume MM B.F.	Volume MM B.F.
Blue	71	Alder	7,030							500	5	5
Fern	54	Creede	6,615							1,260	12	12
Pinos	33	Del Norte	6,995							1,600	22	22
Johns	84	Saguache	2,194							600	7	7
Houselog	81	Saguache	12,565	460	2	500	1					3
Fisher Gulch, Alamosa, Jasper	20, 21, 25	Alamosa	12,265							1,520	26	26
Bellows	70	Alder	9,770							500	5	5
Texas	55	Creede	8,712							1,080	10	10
Bighorn	5	Conejos	4,386			1,000	2					2
Hunters	43	Del Norte	5,094							1,300	18	18
Trout	53	Creede	15,408							1,000	15	15
Houselog	81	Saguache	12,565	1,380	6					130	2	8
Sheep	89	Saguache	20,575	920	4	1,000	2			900	6	12
Kerber	92	Saguache						800	4			4
Deep	50	Creede	14,270							330	4	4
Shallow	66	Creede	1,610							400	5	5
Miners	67	Creede	5,400							250	3	3
Total				4,300	20	5,000	10	2,080	10	45,310	631	671

TRANSPORTATION

Table 13 shows the road survey and construction program needed to harvest the timber listed in the 10-year cutting budget.

Purchaser construction of access roads will normally be required whenever the offering permits amortization of road construction costs. Entire or partial Forest Service-financed construction will be applied whenever the value or volume of the offering is insufficient to permit construction entirely by the purchaser and all-purpose use justifies the construction of the road. Priority of Forest Service construction will be allocated so as to facilitate harvesting areas of potential bark beetle epidemics.

Right-of-Way Needs

Rights-of-way will be obtained sufficiently in advance of road construction to avoid delays in construction. Table 14 lists the rights-of-way needed and includes the scheduling necessary to meet the cutting budget requirements.

Table 13

Road Development Program

Compartment		Road			Construction						Date Survey Required
					Federal		Purchaser		Total		
Name	No.	Name	No.	Class	Miles	Cost	Miles	Cost	Miles	Cost	
Houselog	81	Big Springs	1400	SH12	2.0	7,100			2.0	7,100	Complete
		Browns Tie	40284	SH12			1.2	3,500	1.2	3,500	F.Y. 1962
Kerber	92	Brewery Creek	1433	SH12			3.5	10,500	3.5	10,500	Complete
Alder	72	Alder	1375	SH12					B 1.0	1,000	F.Y. 1962
		Alder	1375	SH12			1.6	8,000	1.6	8,000	Complete
Treasure	23	Rito Gato	1315	SH14	3.6	58,540	2.3	23,800	5.9	82,340	Complete
Pass	40	Lower Pass	1355	SH16		12,100	3.3	17,100	3.3	29,200	Complete
		Pass Creek	1344.1	SH16	.7	8,200			.7	8,200	Complete
		Bonito	1533	SH16			2.6	19,000	2.6	19,000	Complete
California	83	Moon Creek	1405	SH12			4.6	40,900	4.6	40,900	Complete
		California Gulch	1406	SH12			4.5	11,880	B 4.5	11,880	F.Y. 1962
Treasure	23	Park Creek	1342	SH12			2.7	28,350	2.7	28,350	Complete
		Elwood	40044	SH12			1.5	19,200	1.5	19,200	F.Y. 1963
Hot Creek	19	Torsido C.O.	40001	SH12			2.0	4,000	B 2.0	4,000	F.Y. 1963
		Poso Hill	40003	SH12			2.0	4,000	B 2.0	4,000	F.Y. 1963
So. Carnero	78	So. Carnero	1388	SH12	3.0	29,000	1.0	10,200	4.0	39,200	Complete
Saddle	12	Saddle	1314	SH16	4.5	44,220	4.7	74,000	9.2	118,220	Complete
Lake	16	King	40054	SH16	4.5	80,000	2.0	26,000	6.5	106,000	Complete
LaManga	8	Pine River	40081	SH12			4.0	38,000	4.0	38,000	F.Y. 1963
		Grouse	40082	SH12			4.0	38,000	4.0	38,000	F.Y. 1963
		Jarosa	40083	SH12			2.0	19,000	2.0	19,000	F.Y. 1963
Deep	50	N. Lime	1362	SH12			4.7	31,680	4.7	31,680	Complete
Three Forks	13	Knife	40315	SH12			1.5	3,000	1.5	3,000	F.Y. 1965
		Spoon	40314	SH12			1.5	3,000	1.5	3,000	F.Y. 1965
		Rincon	40049	SH12			7.0	73,500	7.0	73,500	F.Y. 1965
		Adams Fork	1316	SH16	12.0	165,000			12.0	165,600	F.Y. 1965
		Blue Lake	40051	SH12	3.0	31,500			3.0	31,500	F.Y. 1965

(Table Continued)

Table 13 (Continued)

Road Development Program

Compartment	Road			Construction						Date Survey Required
				Federal		Purchaser		Total		
Name	No.	Name	No.	Class	Miles	Cost	Miles	Cost	Miles	Cost	
Adams Fork	14	North Fork	1317	SH12	5.0	52,500			5.0	52,500	F.Y. 1965
		North Fork Rim	40050	SH12			4.5	47,250	4.5	47,250	F.Y. 1965
Platoro	15	Haskell Rincon	40020	SH12			9.0	94,500	9.0	94,500	F.Y. 1965
		Diablo	40055	SH12			2.0	21,000	2.0	21,000	F.Y. 1965
		Azul	40052	SH12	2.0	21,000			2.0	21,000	F.Y. 1965
LaGarita	77	Baughmann	1380	SH12			7.5	69,900	7.5	69,900	Complete
Archuleta	1	Chama L.	40068	SH12	7.0	66,500			7.0	66,500	F.Y. 1966
		Cumbres Creek	40072	SH12	8.0	76,000			8.0	76,000	F.Y. 1966
		Chama Park	40070	SH12	7.5	71,250			7.5	71,250	F.Y. 1966
Lower Conejos	7	Eighth Std.	4099	SH12			5.0	7,500	5.0	7,500	F.Y. 1964
Trout	53	Trout Creek Loop	1356	SH16			4.0	62,800	4.0	62,800	F.Y. 1964
		E. Trout Creek	1358	SH14	10.0	120,000			10.0	120,000	F.Y. 1964
		Rainbow	40178	SH12			2.2	4,400	2.2	4,400	F.Y. 1964
		Speckled	40179	SH12			2.4	4,800	2.4	4,800	F.Y. 1964
Beaver	37	Race	40148	SH16	9.0	137,200	3.0	38,000	12.0	175,200	F.Y. 1963
		Little Beaver	1341	SH12			4.0	37,200	4.0	37,200	F.Y. 1963
		Circle	40154	SH12			3.0	3,900	3.0	3,900	F.Y. 1964
		Rabbit	40330	SH12			1.0	1,300	1.0	1,300	F.Y. 1964
		Tejon	40329	SH12			1.5	1,950	1.5	1,950	F.Y. 1964
		Coon	40326	SH12			1.0	1,300	1.0	1,300	F.Y. 1964
Sheep	89	Ward Gulch	40482	SH12	4.0	38,000			4.0	38,000	F.Y.
		Vulcan	40483	SH12			3.0	28,500	3.0	28,500	
Hot Creek	19	Torsido Cutoff	40001	SH12	1.0	2,000	1.0	2,000	2.0	4,000	F.Y. 1966
		Posito	40002	SH12	1.0	2,000	1.0	2,000	2.0	4,000	F.Y. 1966

(Table Continued)

Table 13 (Continued)

Road Development Program

Compartment		Road			Construction						Date Survey Required
					Federal		Purchaser		Total		
Name	No.	Name	No.	Class	Miles	Cost	Miles	Cost	Miles	Cost	
La Garita	77	Baughman	1380	SH12	1.0	9,300			1.0	9,300	F.Y. 1966
		La Garita	1386	SH12	1.0	9,200	3.0	28,000	4.0	37,200	F.Y. 1966
Chama	02	Chama R.	1310	SH12	4.0	40,000	4.0	40,000	8.0	80,000	F.Y. 1966
Ivy	51	Ivy Creek	1361	SH12			1.0	9,500	1.0	9,500	F.Y. 1966
		Ivy Fork	40175	SH12	4.0	38,000	3.0	28,500	7.0	66,500	F.Y. 1966
Poison	45	Trout Creek	1353	SH14	6.0	60,000	4.0	40,000	10.0	100,000	F.Y. 1966
		Metroz	40167	SH12	2.0	19,000	2.0	19,000	4.0	38,000	F.Y. 1966
Johns	84	Wannamaker	40484	SH12			5.0	47,500	5.0	47,500	F.Y. 1967
Treasure	23	Gold Creek	40035	SH16			2.0	26,000	2.0	26,000	F.Y. 1967
		Stunner Br. 1	40036	SH12			1.0	9,500	1.0	9,500	F.Y. 1967
Hot Creek	19	Torsido C. O.	40001	SH12			2.0	4,000	2.0	4,000	F.Y. 1967
		Poso Hill	40003	SH12			2.0	4,000	2.0	4,000	F.Y. 1967
Platoro	15	Kerr Lake	1320	SH12	5.0	47,500	1.0	9,500	6.0	57,000	F.Y. 1967
Jasper	22	Big Finger	40489	SH12			2.0	19,000	2.0	19,000	F.Y. 1967
Saddle	12	Hansen	40063	SH12			2.0	20,000	2.0	20,000	F.Y. 1967
		Roaring Gulch	40064	SH12	1.0	38,000	1.0	10,000	4.0	48,000	F.Y. 1967
Red	52	Stream's	40176	SH12	7.8	74,100			7.8	74,100	F.Y. 1967
		Stream's Fork	40177	SH12			2.0	19,000	2.0	19,000	F.Y. 1967
Burro	32	Burro Creek	1336	SH14	11.5	126,500			11.5	126,500	F.Y. 1967
		E. Fork Pinos	40162	SH12			3.0	28,500	3.0	28,500	F.Y. 1967
		Bennett Creek	1335	SH14	3.5	37,000	4.5	51,000	8.0	88,000	F.Y. 1967
Spruce Lake	41	S. Fork R.G.	1347	SH14	14.0	182,000	10.0	130,000	24.0	312,000	F.Y. 1968
Platoro	15	King	40054	SH12	1.0	9,500			1.0	9,500	F.Y. 1968
		Mammoth	40053	SH12	2.0	20,000	2.0	20,000	4.0	40,000	F.Y. 1968
Blue	71	Pool Table	1374	SH16	2.5	10,000	1.5	6,000	B 4.0	16,000	F.Y. 1968
		Blue Park	40222	SH12			3.2	9,600	3.2	9,600	F.Y. 1968

(Table Continued)

Table 13 (Continued)

Road Development Program

Compartment		Road			Construction						Date Survey Required
					Federal		Purchaser		Total		
Name	No.	Name	No.	Class	Miles	Cost	Miles	Cost	Miles	Cost	
Fern	54	Fuchs Reservoir	40185	SH12			2.5	23,750	2.5	23,750	F.Y. 1968
		Trout Creek Loop	1356	SH14	6.0	72,000			6.0	72,000	F.Y. 1968
		Ruby Lake	1359	SH12	3.0	28,500			3.0	28,500	F.Y. 1968
		Baldy Lake	40183	SH12			3.0	28,500	3.0	28,500	F.Y. 1968
Pinos	33	West Pinos	1334	SH14	7.0	84,000	5.0	60,000	12.0	144,000	F.Y. 1968
		Hogback Mesa	40152	SH12			3.0	28,500	3.0	28,500	F.Y. 1969
Johns	84	Saguache Park	1409	SH12			2.5	23,750	2.5	23,750	F.Y. 1969
		Sky City	40280	SH12	1.5	14,250			1.5	14,250	F.Y. 1969
		Wannamaker	40484	SH12	2.0	19,000			2.0	19,000	F.Y. 1969
Houselog	81	Hodding Creek	1401	SH12			5.0	15,000	B 5.0	15,000	F.Y. 1969
Fisher	20	Old Joe	40056	SH12			2.0	19,000	2.0	19,000	F.Y. 1969
Alamosa	21	Big Finger	40489	SH12			2.0	19,000	2.0	19,000	Complete
Jasper	25	Silver Lake	40018	SH12			2.0	19,000	2.0	19,000	Complete
Bellows	70	East Bellows	40220	SH14	2.5	30,000	1.5	18,000	4.0	48,000	F.Y. 1969
Texas	55	Fuchs Reservoir	40185	SH12			4.0	38,000	4.0	38,000	F.Y. 1969
		Little Ruby	40186	SH12			3.0	28,500	3.0	28,500	F.Y. 1969
		Ruby Lake	1359	SH14	8.0	96,000			8.0	96,000	F.Y. 1969
Hunters	43	Elk Creek	1351	SH14	5.5	66,000			5.5	66,000	F.Y. 1970
		Shaw Lake	1348	SH14	4.0	48,000			4.0	48,000	F.Y. 1970
		Table Mountain	40166	SH12			2.5	23,750	2.5	23,750	F.Y. 1970
		Round Table	40402	SH12			3.5	33,250	3.5	33,250	F.Y. 1970

(Table Continued)

Table 13 (Continued)

Road Development Program

Compartment		Road			Construction						Date Survey Required
					Federal		Purchaser		Total		
Name	No.	Name	No.	Class	Miles	Cost	Miles	Cost	Miles	Cost	
Trout	53	Knife Edge	40180	SH12	6.0	57,000			6.0	57,000	F.Y. 1970
		Middle Trout	40181	SH12			4.0	38,000	4.0	38,000	F.Y. 1970
		German	40182	SH12			1.5	2,000	1.5	2,000	F.Y. 1970
		Trout Creek Loop	1356	SH14	1.0	12,000			1.0	12,000	F.Y. 1970
Houselog	81	Fullerton Park	1397	SH12			5.5	16,500	5.5	16,500	F.Y. 1970
Sheep	89	Upper Spanish	1421	SH12	7.4	14,000			B 7.4	14,000	F.Y. 1970
		Spanish Creek	1418	SH12			3.0	6,000	3.0	6,000	F.Y. 1970
		Little Gulch	40274	SH12			1.5	4,500	1.5	4,500	F.Y. 1970
		Cub	40275	SH12			3.0	15,000	3.0	15,000	F.Y. 1970
		Sheep Creek	1422	SH12	6.0	18,000			6.0	18,000	F.Y. 1970
		Spruce Creek	1424	SH12	3.0	9,000			3.0	9,000	F.Y. 1970
			40483	SH12			4.0	12,000	4.0	12,000	F.Y. 1970
Deep	50	N. Lime Creek	1362	SH14	3.0	30,000			3.0	30,000	F.Y. 1970
		N. Lime Fork 11	40214	SH12			1.0	3,000	1.0	3,000	F.Y. 1970
		N. Lime Fork 12	40215	SH12			1.0	3,000	1.0	3,000	F.Y. 1970
		N. Lime Fork 13	40216	SH12			1.0	3,000	1.0	3,000	F.Y. 1970
		N. Lime Fork 14	40217	SH12			1.0	3,000	1.0	3,000	F.Y. 1970
Shallow	66	Shallow Creek	40194	SH12	8.0	76,000	2.0	19,000	10.0	95,000	F.Y. 1970
Miners	67	Miners Creek	1500	SH12	6.0	57,000	2.0	19,000	8.0	76,000	F.Y. 1970
Fox	6	Fox Creek	1301	SH12	5.0	20,000	5.0	15,000	10.0	35,000	F.Y. 1970
Bighorn	5	Sheep	40093	SH12	3.0	9,000			3.0	9,000	F.Y. 1970

Table 14

Road Right-of-Way Needs

Compartment		Road		Number of Easements Needed	Volume MM B.F.	Year Needed
Name	No.	Name	No.			
Treasure	23	Park Creek	1312	1	6	F.Y. 1963
Treasure	23	Elwood	40044	1	6	F.Y. 1963
Kerber	92	Upper Kerber Cr.	1434	1	6	F.Y. 1963
Deep	50	N. Lime	1362	3	9	F.Y. 1963
Lower Conejos	7	8th Standard	40094	2	1	F.Y. 1964
Trout	53	Trout Cr. Loop	1356	1	24	F.Y. 1964
Trout	53	E. Trout Creek	1358	2	24	F.Y. 1964
Los Pinos	3	Cumbres Creek	40072	2	25	F.Y. 1965
Chama	2	Chama R.	1310	2	25	F.Y. 1965
Poison	45	Trout Creek	1353	3	14	F.Y. 1965
Poison	45	Metroz	40167	1	14	F.Y. 1965
Treasure	23	Gold Creek	40055	1	8	F.Y. 1966
Platoro	15	Adams Fork	1316	1	70	F.Y. 1966
Platoro	15	Haskell Rincon	40020	1	70	F.Y. 1966
Platoro	15	Diablo	40055	1	70	F.Y. 1966
Red	52	Red Mountain	1360	1	6	F.Y. 1967
Burro	32	Burro Creek	1336	2	26	F.Y. 1967
Platoro	15	King	40054	2	6	F.Y. 1968
Platoro	15	Mammoth	40053	3	6	F.Y. 1968
Blue	71	Pool Table	1374	1	5	F.Y. 1968
Fern	54	Trout Creek Loop	1356	4	11	F.Y. 1968
Fern	54	Ruby Lake	1359	3	11	F.Y. 1968
Pinos	33	W. Pinos	1334	1	22	F.Y. 1969
Houselog	81	Hodding Creek	1401	1	3	F.Y. 1969
Texas	55	Ruby Lake	1359	2	10	F.Y. 1969
Sheep	89	Ward Gulch	40482	2	12	F.Y. 1969
Hunters	43	Elk Creek	1351	2	18	F.Y. 1970
Houselog	81	Fullerton Park	1397	1	2	F.Y. 1970
Shallow	66	Shallow Creek	40194	1	5	F.Y. 1970
Miners	67	Miners Creek	1500	4	3	F.Y. 1970

SALES POLICY

Most of the timber cut on the forest in the past has gone to the sawmill at South Fork. This mill has operated under three different owners during the past 10 years and as of this date is again up for sale.

New industry will be needed in order to reach the allowable cut objective. Efforts will be directed towards securing an industry, such as a plywood plant, that will utilize at least 30 million board feet of spruce per year. If necessary, a sale of around 300 million board feet will be offered.

Other timber will be offered for sale in such quantity that will permit established operations to maintain at least a three-year supply of stumpage. These smaller sales will normally be for three to five-year periods. Sales of a duration of greater than five years will be made only for the purpose of an expansion of industry.

Sales Priority

The present endemic population of Engelmann spruce beetles threatens to become epidemic in overmature stands. Under this condition, and since the spruce-fir sawtimber types represent 54 percent of the entire coniferous-type area, the highest priority in the sales program will be given to harvesting the overmature high-risk spruce stands.

Points of Manufacture

Timber from the working circle will be appraised to South Fork, Monte Vista or Antonito, Colorado or to Chama, New Mexico. These towns are all served by the Denver and Rio Grande Western Railroad.

Merchantability Specifications

All Species

Maximum Stump Height	-	12"
Minimum Sawtimber Tree	-	10" d.b.h. and containing one merchantable log to an 8" top d.i.b.*
Minimum Merchantable Log	-	8' long 8" d.i.b. small end 33-1/3 percent net scale 20 bd. ft. minimum net scale

*6" top d.i.b. may be specified for lodgepole pine. If this is done, 8" and 9" d.b.h. trees may be included as optional material.

Logging Methods

The important role of timbered lands in multiple use management and their relationship with other land uses requires that good logging and clean-up work be done in harvesting the timber. The effects of harvesting timber should not curtail other land uses.

The various methods of logging should be considered for each sale and the presale prescription report will specify acceptable methods. Animal, tractor, jammer or overhead cable are acceptable methods, depending on soil conditions, slope and type of harvest.

Special consideration will be given to slash disposal on sales of Engelmann spruce due to the potential hazard from bark beetles. Complete slash disposal, entire tree skidding with slash and cull disposal at the landing, or other similar methods will be prescribed for these sales.

TIMBER STAND IMPROVEMENT

Reforestation

The planting needs for the next two periods are outlined in Table 15. Scheduling of the program will be done in the forest's annual reforestation and stand improvement report.

Examinations will be made of areas, such as nonstocked or poorly stocked types, that are indicated by the inventory as needing reforestation. Areas in need of reforestation will be defined in the stand description of the compartment records.

Seed Production Areas

Areas are needed that will be reliable sources for seed of good viability and genetic traits. Examination of potential areas will be made and suitable areas will be established and reserved for seed production by not later than 1967.

Measures to Supplement Natural Regeneration

In the spruce-fir and lodgepole pine types, methods of logging and slash disposal will be used that result in improving the seed bed.

Re-establishment of Conifers in Aspen Type

Areas occupied by aspen types usually have resulted from fires which removed the original coniferous type. Many of these types, therefore, occupy a good site for conifers or support a coniferous understory. To facilitate the re-establishment of conifers, reforestation will be done to build stocking up to desired levels. Release of crop trees will be done to improve growth whenever the aspen overstory impedes the growth. Careful consideration will be given so as to utilize the aspen overstory's advantages to watershed management, its recreational values and its use as a nurse crop.

Thinning

1. Noncommercial - Priority of noncommercial thinnings will be given to areas of overstocked young stands where site quality indicates that good growth response will result.

   Forest inventory data indicate that there are 54,000 acres of well stocked poletimber types. In the seedling-sapling size class, only 3,700 acres are well stocked and these are almost entirely in the lodgepole pine type.

The amount of thinning needed will increase as larger areas are cut over and more is learned about stocking requirements for the spruce-fir type. Thinnings or weedings will be scheduled for lodgepole pine stands less than 70 years of age.

2. Commercial - Commercial thinnings are to be made whenever markets exist for products from ponderosa and lodgepole pine stands of less than sawtimber size. Such products as fence posts and poles will be utilized and industry will be encouraged to use larger amounts of round wood.

Conversion of Stagnated Lodgepole Pine Stands

There are about 10,000 acres of lodgepole pine saplings and poletimber stands that are putting on very little, if any, growth and are too old for release. Commercial sales and other measures will be used to clear cut these areas. Following removal, measures will be applied to insure stocking at proper levels.

Table 15

The Planting Job - 1963 - 1972

Type	Nonstocked (Acres)	Understocked Seedling-Saplings (Acres)	Lodgepole Pine Conversion (Acres)	Aspen Conversion (Acres)	Sawtimber Cut Over (Acres)	Total (Acres)
Douglas-fir				3,000		3,000
Ponderosa Pine				1,000	2,000	3,000
Lodgepole Pine			3,000			3,000
Spruce-Fir	4,000	500		8,000	10,000	22,500
Total	4,000	500	3,000	12,000	12,000	31,500

The Planting Job - 1963 - 1982

Type	Nonstocked (Acres)	Understocked Seedling-Saplings (Acres)	Lodgepole Pine Conversion (Acres)	Aspen Conversion (Acres)	Sawtimber Cut Over (Acres)	Total (Acres)
Douglas-fir				6,000		6,000
Ponderosa Pine				2,000	5,000	7,000
Lodgepole Pine			7,000			7,000
Spruce-Fir	10,000	2,000		22,000	25,000	59,000
Total	10,000	2,000	7,000	30,000	30,000	79,000

PROTECTION

Insects

Engelmann spruce beetles were first discovered in epidemic populations in 1950. Periodically after that epidemics have erupted in the leave strips on several timber sales. Presently, logging and slash treatment measures are used to check outbreaks. Endemic populations are, however, numerous and widespread over the forest, occurring on timber sales and on virgin areas.

The problem is magnified by the extensive area of overmature spruce-fir sawtimber type. Spruce-fir sawtimber represents one-half of all the coniferous types. Of this sawtimber type, 72 percent is beyond the rotation age of 140 years. There is poor access into the type which increases the problems of control and surveillance.

Spruce budworm epidemic activity began in 1945 and has spread throughout the South Fork area.

Black Hills beetle outbreaks have occurred throughout the ponderosa pine type. Salvage logging and chemical treatment have kept any large-scale outbreak from occurring.

Action Program

Spruce-Fir Type - A skeleton road system which will provide access to all major areas of overmature Engelmann spruce stands has been planned and will be constructed as soon as conditions permit. Continuing general surveillance of the entire type, and intensive survey both from the air and ground of susceptible stands and areas of known infestations will be programmed on an annual basis to provide early detection of insect build-up.

Timber sale programming will give priority to insect-infested or susceptible Engelmann spruce stands. Action on going sales will consist of treating Engelmann spruce slash residues by bunching and burning.

Insect infestations, which cannot be controlled by logging and slash treatment because of inaccessibility or other reasons, will be controlled by trap trees, together with chemical treatment or piling and burning of infested material.

Douglas-fir and Associated Types -Surveillance of these types for spruce budworm outbreaks will continue. When warranted, aerial spraying projects will be used for control of the budworm. A 90,000-acre control project is scheduled for 1962.

Black Hills Beetle - Control of this pest will be done through salvaging infected trees and by chemical treatment.

Disease

Dwarfmistletoe (Arceuthobium vaginatum) infection is very heavy in ponderosa pine. Control actions through logging and sale area betterment will result in the removal of the infected stems. The Timber Management Guides for Ponderosa Pine, FSH2-2442.8, will be used in determining the cutting and timber stand improvement practices to be followed.

Animals

All users of the forest will be encouraged to kill porcupines. When advisable, shooting of porcupines by employees will be encouraged by furnishing small-bore ammunition. Poisoning or other controls will be used as necessary to protect plantations from porcupines or other rodents.

Livestock

All plantations will be fenced, if necessary, to protect the trees from livestock damage. The fences will be maintained until the trees are above browse height. Areas to be regenerated by natural means may be fenced, if necessary, for the protection of the reproduction against animal damage.

Wildlife

Plantations will not be established on heavily used winter game range.

Fire

Provision will be made in current sales for reduction of slash or for extra protection for slash areas until the hazard has been abated naturally.

Protection Program

1. A slash disposal plan will be prepared for each sale area in accordance with instructions in FSH 5100.

2. The forest will maintain the equipment and protection organization adequate to keep commercial timberland fires within the annual "PAR" expressed in the fire prevention plan. The necessary equipment and organization will be specified in the presuppression plan.

SUPPORTING DATA

Compartment Records

Within one year after the approval of this plan, a system of compartment records will be set up for each ranger district. This will consist of Form R2-2400-19 and a map maintained in an atlas-size binder for each compartment within the ranger district. The R2-2400-19 will be posted annually. Since balances may be struck at any time, the form provides for a continuous inventory of the compartment. Compartment descriptions for at least those compartments scheduled for cutting during the 10-year period will also be included in the atlas binder. Such descriptions may be made on the back of R2-2400-19. Detailed instructions are in the compartment binder.

Timber Inventory

This plan revision is based on inventory data obtained from the Cooperative Forest Survey - Region Two Inventory Program conducted during 1957-1961.

The inventory was conducted to standards prescribed and agreed to by Forest Survey of the Intermountain Forest and Range Experiment Station, and the Division of Timber Management of Region Two (reference, Field Instructions for Forest Inventory, Rocky Mountain Region, 1956). Forest Survey read the plots and processed the data; Region Two delineated the types on aerial photographs, transferred the types to planimetric maps, printed the final type maps and calculated the area of the types.

Sampling Error

Volume data was based on plots taken at 207 locations. Two plots were taken at each location. Table 25 shows the number of locations for each volume stratum. The sampling error for all volume stratums, based on cubic feet in trees 5.0" d.b.h. and larger, is 4.2 percent (one standard error) for the working circle.

There is no sampling error in the area determination since calculations were based on a 100 percent typing job.

Data Processing

Forest Survey of the Intermountain Forest and Range Experiment Station processed the data through the ADP Section of the Pacific Southwest Station. This was done in accordance with the "Plan for Compilation of Intermountain Forest Survey, Rocky Mountain Area, by IBM Method," October 1, 1956 by Robert M. Miller.

The following NFA tables are on file in the Supervisor's office at Monte Vista, Colorado:

Area

NFA 2 Compartment Area
NFA 3 Block Area Summary
NFA 4 Working Circle Area Summary
NFA 5 Working Circle Area Summary

Volume

NFA 6 Total Average Net Volume Per Acre By Merchantability Class, Volume Stratum, Species, and 10" D.B.H. Class.

NFA 7 Total Average Net Volume Per Acre By Merchantability Class, Volume Stratum, Species, and 2" D.B.H. Class.

NFA 31 Adjusted 10-year Gross Growth and 10-year Mortality Volume Per Acre By Growing Stock.

Miscellaneous Tables - Number of Trees Per Acre and various Forest Survey Summaries.

Copies of the plot tally sheets are on file in the Forest Supervisor's office.

Aerial photographs on which the photo interpretation was done are on file at the Denver Federal Record Center.

Type map plates are stored in the Division of Timber Management, Forest Service, Denver, Colorado.

Method For Calculating Periodic Annual Net Growth

NFA Table 31 in the IBM binder gives the average adjusted 10-year growth increment and 10-year mortality by growth stratums, species and 2" d.b.h. classes. The volumes are shown in both board feet and cubic feet.

The growth stratum codes are as follows:

GS-01 = All conifer sawtimber stands.
GS-02 = All conifer poletimber stands.
GS-03 - All conifer seedling and sapling and nonstocked stands.
GS-04 = All hardwood stands.

The gross 10-year growth is based upon merchantability class (MC-1) trees. These are all live merchantable trees. Mortality is shown under merchantability class (MC-7) trees. These are all mortality trees. The Forest Survey crews estimated the trees that died during the past five years. This volume was then doubled to put it on the same period as the growth. The growth was based on the past 10 years.

The periodic annual net growth per acre can be determined for any given species and d.b.h. class within a growth stratum, or the total of all species in d.b.h. classes within a growth stratum, by subtracting the volume shown for the average 10-year mortality (MC-7) from the average 10-year growth increment (MC-1) and dividing by 10.

Growth stratums do not correspond to volume stratums. The total volume of timber in the working circle and the allowable cuts are based upon volume stratums. It was, therefore, necessary to construct a growth and mortality table for the volume stratums using the data given in NFA Table 31. This was done by weighting the growth and mortality of the species in the growth stratums by the percent of each species in the volume stratums.

Table 16

Estimated Area By Age Classes
80 Years and Older for Major Types

Type and Stocking Class	Total Acres	Age Class 80 Percent	Age Class 80 Acres	Age Class 100 Percent	Age Class 100 Acres	Age Class 120 Percent	Age Class 120 Acres	Age Class 140 Percent	Age Class 140 Acres	Age Class 160 Percent	Age Class 160 Acres	Age Class 180 Percent	Age Class 180 Acres	Total Percent
Douglas-fir S.T.														
Med. Stocked	26,318	-	--	-	-	14.3	3,763	14.3	3,763	35.7	9,396	35.7	9,396	100.0
Poorly Stocked	63,105	33.3	21,014	16.7	10,538	16.7	10,539	6.7	4,228	-	-	26.6	16,786	100.0
Total	89,423	23.5	21,014	11.8	10,538	16.0	14,302	8.9	7,991	10.5	9,396	29.3	26,182	100.0
Ponderosa Pine S.T.														
Med. Stocked	1,444	50.0	722	-	-	-	-	25.0	361	-	-	25.0	361	100.0
Poorly Stocked	47,806	27.3	13,051	9.1	4,350	4.6	2,199	13.6	6,502	4.5	2,151	40.9	19,553	100.0
Total	49,250	28.0	13,773	8.8	4,350	4.5	2,199	13.9	6,863	4.4	2,151	40.9	19,914	100.0
Lodgepole Pine S.T.														
Med. Stocked	6,793	100.0	6,793	-	-	-	-	-	-	-	-	-	-	100.0
Poorly Stocked	9,237	16.6	1,533	16.7	1,543	-	-	-	-	16.7	1,543	50.0	4,618	100.0
Total	16,030	52.0	8,326	9.6	1,543	-	-	-	-	9.6	1,543	28.8	4,618	100.0
Spruce-Fir S.T.														
Well Stocked	300	100.0	300	-	-	-	-	-	-	-	-	-	-	100.0
Med. Stocked	248,445	3.2	7,950	7.4	18,385	8.5	21,118	9.6	23,851	11.7	29,068	59.6	148,073	100.0
Poorly Stocked	149,889	19.3	28,929	9.1	13,640	14.8	22,183	12.5	18,736	17.0	25,481	27.3	40,920	100.0
Total	398,634	9.3	37,179	8.0	32,025	10.9	43,301	10.7	42,587	13.7	54,549	47.4	188,993	100.0

Table 17

Distribution of Site Trees
By Major Types, Age Classes, Stand Size Classes, Stocking Classes

Major Types	Age Groups	Sawtimber						Poletimber						Seedling-Sapling						Nonstocked	
		Trees			Percent			Trees			Percent			Trees			Percent				
		W	M	P	W	M	P	W	M	P	W	M	P	W	M	P	W	M	P	Trees	Percent
Douglas-fir	1- 19																				
	20- 39																				
	40- 59								1			16.7									
	60- 79			5			16.6		2			33.3									
	80- 99			5			16.7	2			40.0										
	100-119			5			16.7	1			20.0										
	120-139		2	5		14.3	16.7		1			16.7									
	140-159		2	2		14.3	6.7		0												
	160-179		5			35.7			0												
	180+		5	8		35.7	26.6	2	2		40.0	33.3									
Total			14	30		100.0	100.0	5	6	-	100.0	100.0	-								
Ponderosa Pine	1- 19																				
	20- 39																				
	40- 59																				
	60- 79		2	1		50.0	4.6			1			50.0								
	80- 99			5			22.7			1			50.0								
	100-119			2			9.1														
	120-139			1			4.5														
	140-159		1	3		25.0	13.6														
	160-179			1			4.5														
	180+		1	9		25.0	40.9														
Total		-	4	22	-	100.0	100.0			2	-	-	100.0								

W, M, and P refer to Well, Medium and Poor Stocking Classes.

(Table Continued)

Table 17 (Continued)

Distribution of Site Trees
By Major Types, Age Classes, Stand Size Classes, Stocking Classes

Major Types	Age Groups	Sawtimber						Poletimber						Seedling-Sapling						Nonstocked	
		Trees			Percent			Trees			Percent			Trees			Percent				
		W	M	P	W	M	P	W	M	P	W	M	P	W	M	P	W	M	P	Trees	Percent
Lodgepole Pine	1- 19																				
	20- 39																				
	40- 59																				
	60- 79							2	2		33.3	100.0									
	80- 99			1			16.6														
	100-119			1			16.7	3			50.0										
	120-139																				
	140-159							1			16.7										
	160-179			1			16.7														
	180+			3			50.0														
Total		-	-	6	-	-	100.0	6	2	-	100.0	100.0	-								
Spruce-Fir	1- 19																				
	20- 39								1	1		3.9	7.2			2			100.0	1	100.0
	40- 59			2			2.3		4	5		15.4	35.7								
	60- 79		1	7		1.1	7.9		8	2		30.8	14.3								
	80- 99		2	8		2.1	9.1	1	1	2	25.0	3.8	14.3								
	100-119		7	8		7.4	9.1	1	2	3	25.0	7.7	26.4								
	120-139		8	13		8.5	14.8		1	1		3.8	7.1								
	140-159		9	11		9.6	12.5	1	2		25.0	7.7									
	160-179		11	15		11.7	17.0	1	4		25.0	15.4									
	180+		56	24		59.6	27.3		3			11.5									
Total			99	88		100.0	100.0	4	26	14	100.0	100.0	100.0			2	-	-	100.0	1	100.0

W, M, and P refer to Well, Medium and Poor Stocking Classes.

Table 18

Summary of Annual Net Growth and Mortality Per Acre
By Sawtimber Types

Major Sawtimber Types	Annual Net Growth Per Acre			Annual Mortality Per Acre			Area in Type Acres	Total Annual Net Growth		
	Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet CF	Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet CF		Int. ¼" MBF	Scrib. Dec. C MBF	Cubic Feet MCF
Douglas-fir	7.40	6.30	2.05	1.14	0.96	0.37	89,423	662	567	183
Ponderosa Pine	2.88	2.44	0.80	0.88	0.70	0.22	49,250	142	120	39
Lodgepole Pine	1.17	1.02	0.22	0.54	0.45	0.26	16,030	19	16	4
Spruce-Fir	53.64	46.83	12.03	10.00	8.56	4.68	398,634	21,383	18,668	4,796
White Pine Group	18.36	16.27	3.78	2.19	1.91	0.44	7,353	135	120	28
Total	39.84	34.76	9.01	7.42	6.33	1.74	560,690	22,341	19,491	5,050

Table 19

Average Volume Per Acre By Species and Stocking Class

DOUGLAS-FIR SAWTIMBER TYPE

Small Sawtimber

Species	Stocking Class: Medium (VS-1) Int. ¼" BF	Medium (VS-1) Scrib. Dec. C BF	Medium (VS-1) Cubic Feet CF	Poor (VS-2) Int. ¼" BF	Poor (VS-2) Scrib. Dec. C BF	Poor (VS-2) Cubic Feet CF	Weighted Average Int. ¼" BF	Weighted Average Scrib. Dec. C BF	Weighted Average Cubic Feet CF	Percent of Species Based on: Int. ¼"	Scrib. Dec. C	Cubic Feet
Douglas-fir	4,434.38	3,615.79	1,032.32	3,005.11	2,390.40	800.62	3,425.75	2,751.03	868.81	65.26	64.99	65.01
Ponderosa Pine	295.81	226.21	65.64	141.98	110.59	34.50	187.25	144.62	43.66	3.57	3.42	3.27
Lodgepole Pine						11.88			8.38			0.63
Limber Pine,etc.	1,079.84	837.38	241.04	335.18	273.07	101.31	554.33	439.14	142.43	10.56	10.37	10.66
White Fir	1,301.37	1,128.04	284.22	363.95	302.15	76.08	639.83	545.21	137.34	12.19	12.88	10.28
Subalpine Fir				13.66	11.51	17.39	9.64	8.12	12.27	0.18	0.19	0.92
Engelmann Spruce	48.72	39.59	9.02	282.93	227.37	77.30	214.00	172.11	57.21	4.08	4.06	4.28
Blue Spruce				123.83	103.01	30.17	87.39	72.69	21.29	1.66	1.72	1.59
Aspen	312.09	242.89	60.13	55.63	40.86	38.59	131.11	100.32	44.93	2.50	2.37	3.36
Total	7,472.21	6,089.90	1,692.37	4,322.27	3,458.96	1,187.84	5,249.30	4,233.24	1,336.32	100.00	100.00	100.00

Area in Volume Stratum

Acres	26,318	63,105	89,423
Percent	29.43	70.57	100

Table 20

Stock and Stand Table By D.B.H. and Stocking Class

DOUGLAS-FIR SAWTIMBER TYPE

Average Per Acre

D.B.H. Class 10" : 2"	Stocking Class: Medium (VS-1) No. of Trees	Medium (VS-1) Volume: Board Feet Int. ¼" BF	Medium (VS-1) Volume: Board Feet Scrib. Dec. C BF	Medium (VS-1) Volume: Cubic Feet CF	Poor (VS-2) No. of Trees	Poor (VS-2) Volume: Board Feet Int. ¼" BF	Poor (VS-2) Volume: Board Feet Scrib. Dec. C BF	Poor (VS-2) Volume: Cubic Feet CF	Weighted Average No. of Trees	Weighted Average Volume: Board Feet Int. ¼" BF	Weighted Average Volume: Board Feet Scrib. Dec. C BF	Weighted Average Volume: Cubic Feet CF
0 : 1.0- 2.9	50.00				166.65				132.32			
: 3.0- 4.9					119.04				84.01			
1 : 5.0- 6.9	30.00			79.18	73.81			166.25	60.92			140.62
: 7.0- 8.9	30.00			126.83	30.95			134.01	30.67			131.90
: 9.0-10.9	20.00	749.40	524.00	159.25	27.38	821.29	529.70	214.48	25.21	800.14	528.02	198.23
2 :11.0-12.9	30.00	1,455.99	1,112.11	321.74	10.85	550.82	420.20	119.37	16.48	817.21	623.83	178.93
:13.0-14.9	17.00	1,186.04	948.31	248.05	7.03	518.55	418.18	106.13	9.96	714.99	574.20	147.90
:15.0-16.9	10.50	1,028.65	852.10	204.57	5.24	591.05	496.30	114.96	6.79	719.84	601.01	141.33
:17.0-18.9	6.50	1,017.40	871.47	192.08	2.86	398.84	338.74	75.68	3.93	580.88	495.52	109.94
:19.0-20.9	3.50	728.53	629.63	133.81	2.03	413.50	356.70	75.96	2.46	506.21	437.02	92.98
3 :21.0-22.9	2.00	523.66	451.30	94.31	1.79	474.42	404.70	85.66	1.85	488.91	418.42	88.21
:23.0-24.9	0.50	126.54	106.40	22.00	0.48	143.26	122.91	24.63	0.49	138.34	118.05	23.86
:25.0-26.9	0.50	205.20	180.88	34.76	0.36	138.17	123.30	24.48	0.40	157.90	140.25	27.50
:27.0-28.9					0.24	114.27	101.79	19.79	0.17	80.64	71.83	13.96
:29.0-30.9												
4 :31.0-32.9												
:33.0-34.9												
:35.0-36.9	0.50	450.80	413.70	75.79					0.15	132.67	121.75	22.30
:37.0-38.9												
:39.0-40.9												
5 :41.0-42.9					0.12	158.10	146.44	26.44	0.08	111.57	103.34	18.66
Total	201.00	7,472.21	6,089.90	1,692.37	448.83	4,322.27	3,458.96	1,187.84	375.89	5,249.30	4,233.24	1,336.32

Table 21

Average Net Volume Per Acre By Species
and Kind of Volume

PONDEROSA PINE SAWTIMBER TYPE

Volume Stratum 03

Species	Volume Per Acre					
	Board Feet				Cubic Feet	
	Int. ¼"	Percent	Scrib. Dec. C	Percent		Percent
Douglas-fir	713.73	29	541.94	29	175.41	29
Ponderosa Pine	1,470.63	60	1,128.39	60	370.88	61
Lodgepole Pine	30.00	1	23.46	1	5.85	1
White Pine Group	54.38	2	47.13	2	10.91	2
White Fir	157.27	6	129.49	6	30.89	5
Blue Spruce	17.40	1	13.64	1	3.24	1
Aspen	11.94	1	9.25	1	7.42	1
Total	2,455.35	100	1,893.30	100	604.60	100

Table 22

Average Net Volume Per Acre By Species
and Kind of Volume

LODGEPOLE PINE SAWTIMBER TYPE

Volume Stratum 04

Species	Volume Per Acre					
	Board Feet				Cubic Feet	
	Int. ¼"	Percent	Scrib. Dec. C	Percent		Percent
Douglas-fir	576.23	9	484.36	10	111.20	6
Lodgepole Pine	5,678.08	91	4,305.26	90	1,881.50	94
Total	6,254.31	100	4,789.62	100	1,992.70	100

Table 23

Average Volume Per Acre By Species and Stocking Class

SPRUCE-FIR SAWTIMBER TYPE

Species	Stocking Class: LST Med. & Poor, SST Well (VS-07) Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet CF	SST Medium (VS-08) Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet CF	SST Poor (VS-09) Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet CF	Weighted Average Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet CF	Percent of Species Based On: Int. ¼"	Scrib. Dec.C	Cubic Feet
Douglas-fir				55.36	45.03	18.44	169.26	138.77	36.74	98.09	80.19	25.29	0.74	0.73	0.86
Lodgepole Pine							127.06	94.74	30.90	47.75	35.60	11.61	0.36	0.32	0.39
White Pine Group				69.83	51.79	20.43	30.50	20.74	12.36	54.95	40.05	17.37	0.42	0.37	0.59
White Fir						1.09						0.68			0.02
Subalpine Fir	2,479.69	1,990.56	539.38	2,105.67	1,746.00	521.95	594.63	478.17	231.77	1,538.35	1,269.89	412.92	11.67	11.57	14.02
Engelmann Spruce	37,998.94	32,825.18	7,041.31	15,135.04	12,700.84	3,129.18	4,693.21	3,806.54	1,212.48	11,243.01	9,386.54	2,414.36	85.25	85.49	81.96
Blue Spruce				29.12	24.97	6.47	360.66	289.07	81.23	153.67	124.19	34.56	1.16	1.13	1.17
Aspen				55.54	46.04	20.03	47.35	37.97	44.43	52.38	42.94	29.17	0.40	0.39	0.99
Total	40,478.63	34,815.74	7,580.69	17,450.56	14,614.67	3,717.59	6,022.67	4,866.00	1,649.91	13,188.20	10,979.40	2,945.96	100.00	100.00	100.00

Area in Volume Stratum				
Acres	565	248,255	149,814	398,634
Percent	0.14	62.28	37.58	100

Table 24

Stock and Stand Table By D.B.H. and Stocking Class

SPRUCE-FIR SAWTIMBER TYPE

Average Per Acre

D.B.H. Class 10" : 2"	Stocking Class: LST Med. & Poor SST Well (VS-07) — No. of Trees	Volume: Board Feet Int. ¼" BF	Board Feet Scrib. Dec. C BF	Cubic Feet CF	SST Medium (VS-08) — No. of Trees	Volume: Board Feet Int. ¼" BF	Board Feet Scrib. Dec. C BF	Cubic Feet CF	SST Poor (VS-09) — No. of Trees	Volume: Board Feet Int. ¼" BF	Board Feet Scrib. Dec. C BF	Cubic Feet CF	Weighted Average — No. of Trees	Volume: Board Feet Int. ¼" BF	Board Feet Scrib. Dec. C BF	Cubic Feet CF
0 : 1.0- 2.9:					175.93:				195.12:				182.90:			
3.0- 4.9:					115.74:				146.35:				127.09:			
1 : 5.0- 6.9:	37.50:			106.43:	64.37:			210.72:	81.71:			226.39:	70.85:			216.46
7.0- 8.9:	50.00:			284.35:	50.93:			331.78:	51.23:			303.02:	51.04:			320.91
9.0-10.9:	37.50:	2,016.13:	1,489.50:	404.53:	46.30:	2,769.62:	2,089.15:	532.34:	31.10:	1,683.73:	1,245.39:	324.97:	40.58:	2,360.49:	1,771.23:	454.24
2 :11.0-12.9:	27.50:	3,216.83:	2,652.41:	590.53:	28.30:	2,696.06:	2,188.07:	502.12:	15.44:	1,324.47:	1,062.24:	248.42:	23.47:	2,181.35:	1,765.63:	406.90
13.0-14.9:	43.75:	6,624.38:	5,574.21:	1,206.65:	21.07:	3,004.50:	2,525.33:	549.73:	8.60:	1,102.50:	919.29:	202.82:	16.42:	2,294.80:	1,926.05:	420.28
15.0-16.9:	30.00:	6,362.96:	5,461.43:	1,149.08:	13.98:	2,842.73:	2,438.36:	514.63:	4.28:	740.09:	628.65:	134.41:	10.36:	2,057.49:	1,762.50:	372.63
17.0-18.9:	26.25:	7,511.88:	6,524.63:	1,349.28:	7.68:	2,125.72:	1,845.80:	382.33:	2.68:	645.34:	557.21:	116.35:	5.83:	1,576.93:	1,368.10:	283.72
19.0-20.9:	7.50:	2,816.63:	2,466.45:	504.16:	4.07:	1,414.49:	1,238.50:	253.39:	0.79:	200.96:	174.44:	36.31:	2.84:	960.41:	840.34:	172.16
3 :21.0-22.9:	5.00:	2,180.18:	1,902.56:	376.28:	2.55:	1,142.90:	991.82:	198.13:	0.55:	187.21:	158.36:	33.34:	1.80:	785.20:	679.88:	136.45
23.0-24.9:	6.25:	3,230.97:	2,851.46:	548.32:	1.16:	614.05:	539.59:	104.57:	0.18:	77.18:	66.40:	13.55:	0.80:	415.96:	365.00:	70.99
25.0-26.9:	3.75:	2,520.11:	2,245.73:	419.04:	0.61:	410.26:	367.03:	68.10:	0.12:	61.19:	54.02:	10.33:	0.43:	282.03:	252.03:	46.88
27.0-28.9:	:	:	:	:	0.09:	77.59:	70.02:	12.67:	:	:	:	:	0.06:	48.32:	43.61:	7.89
29.0-30.9:	1.25:	1,126.91:	1,020.60:	182.97:	0.24:	192.15:	174.15:	31.41:	:	:	:	:	0.15:	121.25:	109.89:	19.82
4 :31.0-32.9:	1.25:	1,272.89:	1,159.33:	204.86:	0.05:	49.16:	44.84:	7.90:	:	:	:	:	0.03:	32.40:	29.55:	5.21
33.0-34.9:	1.25:	1,598.76:	1,467.43:	254.21:	0.05:	53.25:	48.72:	8.52:	:	:	:	:	0.03:	35.40:	32.40:	5.66
35.0-36.9	:	:	:	:	0.05:	58.08:	53.29:	9.25:	:	:	:	:	- :	36.17:	33.19:	5.76
Total	278.75:	40,478.63:	34,815.74:	7,580.69:	533.17:	17,450.56:	14,614.67:	3,717.59:	538.15:	6,022.67:	4,866.00:	1,649.91:	534.68:	13,188.20:	10,979.40:	2,945.96

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Table 25

Area, Volume Per Acre, and Total Volume By Volume Stratums
Unreserved National Forest Lands

Rio Grande Working Circle

Volume Stratum No.	Type	Stand Size Class	Stocking Class	No. of Loca-tions	Area Acres	Volume Per Acre: Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet CF	Total Volume: Int. ¼" MBF	Scrib. Dec. C MBF	Cubic Feet MCF
1	Douglas-fir	SST	Med.	5	26,318	6,722.81	5,565.90	1,692.37	176,931	146,483	44,540
2	Douglas-fir	SST	Poor	21	63,105	3,500.98	2,929.26	1,187.84	220,929	184,851	74,959
-	Ponderosa Pine	SST	Med.	0	1,444		VS-03		3,209	2,563	873
3	Ponderosa Pine	SST	Poor	11	47,806	2,222.27	1,774.77	604.60	106,238	84,845	28,904
-	Lodgepole Pine	SST	Med.	0	6,793		VS-04		17,776	14,602	13,536
4	Lodgepole Pine	SST	Poor	3	9,237	2,616.82	2,149.63	1,992.70	24,172	19,856	18,406
5	White Pine Group	SST	Med.	2	150	4,064.54	3,371.63	1,103.33	610	506	165
6	White Pine Group	SST	Poor	5	7,203	2,427.34	2,006.16	812.85	17,484	14,450	5,855
-	White Fir	SST	Poor	0	125		VS-02		438	366	148
7	Spruce-Fir	LST	Med.	2	190	38,462.50	33,326.24	7,580.69	7,308	6,332	1,440
-	Spruce-Fir	LST	Poor	0	75		VS-07		2,885	2,499	568
-	Spruce-Fir	SST	Well	0	300		VS-07		11,539	9,998	2,274
8	Spruce-Fir	SST	Med.	54	248,255	14,680.94	12,525.52	3,717.59	3,644,617	3,109,523	922,910
9	Spruce-Fir	SST	Poor	41	149,814	4,338.94	3,620.61	1,649.91	650,034	542,418	247,180
Total Sawtimber				144	560,815	8,709.06	7,380.85	2,428.18	4,884,170	4,139,292	1,361,758
10	Douglas-fir	PT	W&M	4	45,801	1,719.54	1,391.98	729.52			33,413
-	Douglas-fir	PT	Poor	0	1,695		VS-10				1,236
-	Ponderosa Pine	PT	W&M	0	3,339		VS-11				2,414
11	Ponderosa Pine	PT	Poor	1	2,050	2,897.80	2,367.17	722.96			1,482
12	Lodgepole Pine	PT	W&M	4	16,054	1,031.00	842.50	878.02			14,096
-	Lodgepole Pine	PT	Poor	0	75		VS-12				66
-	White Pine Group	PT	W&M	0	10,711		VS-13				1,026
13	White Pine Group	PT	Poor	1	665	450.63	347.38	95.83			64
-	White Fir	PT	Med.	0	40		VS-10				29
14	Spruce-Fir	PT	Well	2	16,131	1,057.40	870.40	1,157.45			18,671
15	Spruce-Fir	PT	Med.	8	23,657	823.31	671.08	653.75			15,466
16	Spruce-Fir	PT	Poor	7	15,560	657.42	541.46	335.31			5,217
Total Poletimber				27	135,778			686.27			93,180

(Table Continued)

Table 25 (Continued)

Area, Volume Per Acre, and Total Volume By Volume Stratums
Unreserved National Forest Lands

Volume Stratum No.	Type	Stand Size Class	Stocking Class	No. of Locations	Area Acres	Volume Per Acre: Int. 1/4" BF	Volume Per Acre: Scrib. Dec. C BF	Volume Per Acre: Cubic Feet CF	Total Volume: Int. 1/4" MBF	Total Volume: Scrib. Dec. C MBF	Total Volume: Cubic Feet MCF
-	Douglas-fir	S-S	Poor	0	100	None					
-	Ponderosa Pine	S-S	Poor	0	20	None					
-	Lodgepole Pine	S-S	W&M	0	3,840	None					
-	Spruce-Fir	S-S	W&M	0	1,145		VS-17				73
17	Spruce-Fir	S-S	Poor	1	3,165			63.45			201
Total Seedling-Sapling				1	8,270			33.13			274
-	White Pine Group	NS	-	0	20	None					
18	Spruce-Fir	NS	-	1	28,724			143.35			4,118
Total Nonstocked				1	28,744			143.26			4,118
Total Coniferous Types				173	733,607			1,989.25	4,884,170	4,139,292	1,459,330
19	Aspen	SST	-	1	3,960	4,571.35	3,873.90	1,302.44			5,158
20	Aspen	PT	-	26	196,777			1,003.17			197,401
21	Aspen	S-S	-	9	38,294			157.94			6,048
-	Aspen	NS	-	0	20	None					
-	Other Hardwoods	SST	M&P	0	320	VS-24, SU-28		1,246.00			399
-	Other Hardwoods	PT	Poor	0	80	None					
Total Hardwoods				27	239,451			872.85			209,006
Grand Total				200	973,058			1,714.53	4,884,170	4,139,292	1,668,336

Note: Board foot volume in trees 11.0 inches D.B.H. and larger.
Cubic foot volume in trees 5.0 inches D.B.H. and larger.

Tab 6

Area and Volume By Volume Stratum and Ownership

Note: Board ft. volume in trees 11.0" D.B.H. and larger. Cubic ft. volume in trees 5.0" D.B.H. and Larger

Volume Stratum No.	Type	Stand Size Class	Stock-ing Class	Volume Per Acre: Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet CF	State and County Lands: Area Acres	Total Volume: Int. ¼" MBF	Scrib. Dec.C MBF	Cubic Feet MCF	Privately-Owned Lands: Area Acres	Total Volume: Int. ¼" MBF	Scrib. Dec.C MBF	Cubic Feet MCF
1	Douglas-fir	SST	Med.	6,722.81	5,565.90	1,692.37	40	269	223	68	465	3,126	2,588	787
2	Douglas-fir	SST	Poor	3,500.98	2,929.26	1,187.84	380	1,330	1,113	451	2,085	7,300	6,108	2,477
-	Ponderosa Pine	SST	Med.		VS-03						190	422	337	115
3	Ponderosa Pine	SST	Poor	2,222.27	1,774.77	604.60	340	756	603	206	3,333	7,407	5,915	2,015
4	Lodgepole Pine	SST	Poor	2,616.82	2,149.63	1,992.70					96	251	206	191
6	White Pine Gr.	SST	Poor	2,427.34	2,006.16	812.85					130	316	261	106
-	Spruce-Fir	LST	Poor		VS-07						10	385	333	76
8	Spruce-Fir	SST	Med.	14,680.94	12,525.52	3,717.59					2,603	38,214	32,604	9,677
9	Spruce-Fir	SST	Poor	4,338.94	3,620.61	1,649.91	90	390	326	148	3,680	15,967	13,324	6,072
Total Sawtimber				5,663.81	4,756.81	1,665.60	850	2,745	2,265	873	12,592	73,388	61,676	21,516
10	Douglas-fir	PT	W&M	1,719.54	1,391.98	729.52	340			248	2,300			1,678
-	Douglas-fir	PT	Poor		VS-10						125			91
-	Ponderosa Pine	PT	W&M		VS-11						135			98
11	Ponderosa Pine	PT	Poor	2,897.80	2,367.17	722.96					85			61
12	Lodgepole Pine	PT	W&M	1,031.00	842.50	878.02					176			154
-	White Pine Gr.	PT	Med.		VS-13						525			50
13	White Pine Gr.	PT	Poor	450.63	347.38	95.83					50			5
14	Spruce-Fir	PT	Well	1,057.40	870.40	1,157.45					335			388
15	Spruce-Fir	PT	Med.	823.31	671.08	653.75	10			6	825			539
16	Spruce-Fir	PT	Poor	657.42	541.46	335.31	42			14	328			110
Total Poletimber						652.39	392			268	4,884			3,174
-	Douglas-fir	S-S	Well			None					20			
17	Spruce-Fir	S-S	Poor			63.45					20			1
Total Seedling-Sapling						25.00	-				40			1
-	White Pine Gr.	NS	-			None					10			
18	Spruce-Fir	NS	-			143.35					410			59
Total Nonstocked						140.48	-				420			59
Total Coniferous Types							1,242			1,114	17,936			24,750
20	Aspen	PT	-			1,003.17	435			436	5,109			5,125
21	Aspen	S-S	-			157.94	40			6	1,710			270
	Other Hwds.	SST	M&P			VS-24, SU-28					420			
	Other Hwds.	PT	Poor			None					10			
Total Hardwoods							475				7,249			
Grand Total							1,717				25,185			

1962 - 1972 CUTTING BUDGET

COMPARTMENT MAP
RIO GRANDE WORKING CIRCLE-1

LEGEND

Compartment boundary ——

Block boundary ▬▬

(Block and District names and boundaries are identical)

Revised 2/60 T.W.S. & R.B.M.

SAGUACHE BLOCK

CREEDE BLOCK

ALDER BLOCK

DEL NORTE BLOCK

ALAMOSA BLOCK

CONEJOS BLOCK

(THIS COMPARTMENT OF SAGUACHE ALAMOSA BLOCK ADMINISTERED BY SAN ISABEL NAT'L FOREST)

U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
LYLE F. WATTS, CHIEF
T. W. NORCROSS, CHIEF, DIVISION OF ENGINEERING

RIO GRANDE NATIONAL FOREST
COLORADO
NEW MEXICO AND SIXTH PRINCIPAL MERIDIANS
1947

Scale 1 ½ 0 1 2 3 4 5 Miles

LEGEND

- National Forest Boundary
- Adjacent National Forest Boundary
- Good motor road
- Poor motor road
- Trail
- Schoolhouse
- Wilderness area (100,000 acres or more)
- Wild area (less than 100,000 acres)
- Commercial or municipal air field
- Railroad
- Telephone line
- Supervisor's headquarters, District ranger station, National Forest Land * — Report fires here
- Guard or ranger station (not permanently occupied)
- Triangulation station
- House, cabin or other building
- Improved forest camp
- Improved picnic ground
- Permanent lookout station

Compiled at Regional Office Denver, from Forest Service and S.C.S. aerial surveys, B.L.M., U.S.G.S. and other surveys by R.F.Burrus and F.E.Washburn. Drawn by R.E.Burrus, December, 1947

CAUTION: The accuracy of this map is unknown, since compiled from sources of unknown accuracy.

* NOTE: Since the area of National Forest Land is subject to change, this information is not absolutely correct to date.

23 - RIO GRANDE NATIONAL FOREST

1 - Rio Grande Working Circle

1 - Conejos Block

001	Archuleta	007	Lower Conejos
002	Chama	008	La Manga
003	Los Pinos	009	Elk
004	Osier	010	Conejos
005	Big Horn	011	South Fork
006	Fox	012	Saddle

2 - Alamosa Block

013	Three Forks	022	Telluride
014	Adams	023	Treasure
015	Platoro	024	Wightman
016	Lake	025	Jasper
017	Trail	026	Cat Creek
018	Jim	027	Rock
019	Hot Creek	028	Raton
020	Alamosa	029	Deadmans
021	Fisher Gulch	* 096	Dunes

3 - Del Norte Block

030	Frisco	040	Pass
031	Bennett	041	Spruce
032	Burro	042	Hope
033	Pinos	043	Hunters
034	Schrader	044	Decker
035	Wolf	045	Poison
036	Willow	046	Raspberry
037	Beaver	047	Goose
038	Mill	048	Fisher
039	Park	049	Pierce

4 - Creede Block

050	Deep	059	Quartzite
051	Ivy	060	Pole
052	Red	061	Lost Trail
053	Trout	062	Crooked
054	Fern	063	Hermit
055	Texas	064	Clear
056	Upper Rio Grande Wild Area	065	Bristol
		066	Shallow
057	Reservoir	067	Miners
058	Starvation	068	Mammoth
		069	Farmers

5 - Alder Block

070	Bellows	075	Old Woman
071	Blue	076	Lower La Garita
072	Alder	077	La Garita
073	Bear	078	Cave
074	Embargo	079	Carnero

6 - Saguache Block

080	Tracy	087	Saguache
081	House Log	088	Ludera
082	Squaw	089	Sheep
083	California	090	Middle
084	Johns	091	Ford
085	Sheep Mtn.	092	Kerber
086	Stone Cellar	093	San Luis
		094	Hayden
		095	Crestone

*Administered by San Isabel Forest

Cutting Budget and Road Development Program

Sale Areas

Roads

Note: Roads with 3 Digit Numbers are Prefixed 40____, Example 40180